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## ORIGINAL ARTICLES

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### A PHASE OF SKELETAL GROWTH AS INFLUENCED BY THE SEX HORMONES\*

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THE removal of the sex organs, the testicles or the ovaries, in lower animals before they reach maturity causes certain morphologic and physiologic changes in the skeletal conformation. Animal breeders have for years recognized such phenomena in skeletal growth.<sup>1</sup> That the highest order of animal life should show imbalances of growth incident to the same cause would be expected. Experimentation, by the surgical removal of the sex organs in the human, cannot be considered. However, through investigation of more than 2,000 people, all applying for treatment in ductless gland anomalies, we were able to find twenty-two of this number who presented definite hypogonadal characteristics. This number was almost equally divided as to sex, there being ten males and twelve females. With the exception of one, a pure blood negro, female, aged eighteen years, all were Caucasians.<sup>†</sup>

In the group of females, whose ages ranged from fourteen to fifty-five years, not one had ever menstruated. Only one was as young as fourteen years, two were fifteen years, and the others ranged from sixteen to fifty-five years. The advent of pubescence in the female is made unmistakable by menstrual hemorrhage. The nonadvent of menstruation in the very young females, ages fourteen and fifteen, was not employed in selecting them as hypogonadal types. Their extreme juvenile sexual organs as well as other juvenile body markings determined their retarded sexual status.

The males were from thirteen to thirty years of age. In the male the advent of pubescence can best be determined by the signs of secondary sex manifestations, the appearance of hair growth upon the pubic and axillary regions, the rudimentary beard, change of voice tone, the increase of growth and develop-

\*Presented at the Annual Meeting of the Georgia Academy of Science, Atlanta, 1932.

†This material was obtained from the physical records of The Good Samaritan (Endocrine) Clinic of Atlanta.

ment of the genitalia. In fact, the boy as a physical unit shows unmistakable signs of metamorphosis, the change from childhood to manhood. All such signs were negative in this group of males.

With such known manifestations as a guide in selecting this group of twenty-two cases, we feel sure that our approach is in accord with the sound principles of scientific investigation.

#### SIMILARITIES IN BONE GROWTH

To evaluate properly the unusual, we must first establish the average. The average infant is born with a disproportion of leg length as compared to torso or body length, the torso length being always in excess of the leg length. At some

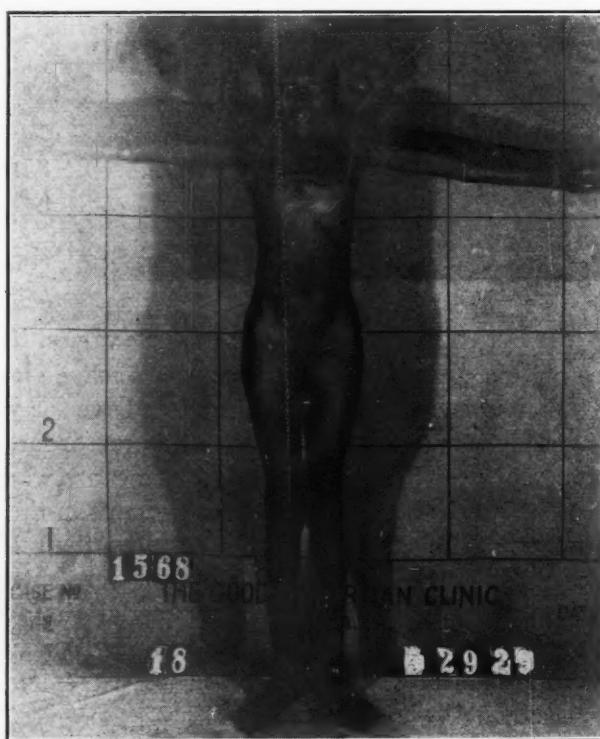


Fig. 1.—See Table I, Case 1568, for physical findings.

time, probably during adolescence, these two anatomic parts become equal, or approximately so. Also the span (outstretched arms) should become approximately equal to the total height.

In these hypogonadal sexually underdeveloped people, we found twenty of the twenty-two presenting a leg length in excess of torso length. The greatest was in a female, aged eighteen years, whose leg length was 7.5 inches in excess of torso length. Two cases presented a torso length in excess of leg length; one showed 1 inch, the other 1.75 inches. No explanation will be attempted for this variation.

#### BONE PROGRESS OF THE HAND

Another striking constancy in bone progress is that this type of person shows a marked retardation in the growth union of the epiphyses of the meta-

carpus and phalanges of the hand, as well as the epiphyses of the ulna and radius. A typical case is shown in Figs. 1 and 2. Although this patient, as well as others of the group, is at or beyond the chronologic age of maturity, the epiphyses have as yet failed to unite with their parent bones.

Figs. 3 and 4 illustrate the opposite influence of sex hormones. The hand of this girl, who was only twelve years old when the radiogram was made, and who menstruated before nine years of age, shows a complete bony union of all epiphyses of the metacarpus and phalanges with their parent bones. This lat-



Fig. 2.—Note delayed epiphyseal union with the parent bones.

ter case is quite definitely a hypergonadal individual. Her physical measurements were equal. All secondary sex manifestations were markedly advanced—hair distribution, mammary development, etc. By actual history from an orthodontic observation, a definite progress of mandibular overgrowth became arrested at about thirteen years of age. Our diagnosis was a Class III case of a pseudoacromegalic type. Such cases were pointed to in an article by the author in 1926.<sup>2</sup> It has been well established that the average normal individual will show a closure of epiphyseal spaces in the female at about eighteen years and in the male at about twenty-one years.<sup>3</sup>

## CORRELATION OF JAW AND ARCH GROWTH

It is of particular interest to the student whose field is that of growth manifestation of the jaws and arches to find that sixteen of these twenty-two people presented an abnormal growth of these parts. This strongly suggests that the hormones affecting general skeletal and hand-bone growth were also responsible for the inharmonies of growth of the dental arches and jaws of this type of person.

These sixteen cases of malocclusion were divided in accord with Angle's clas-

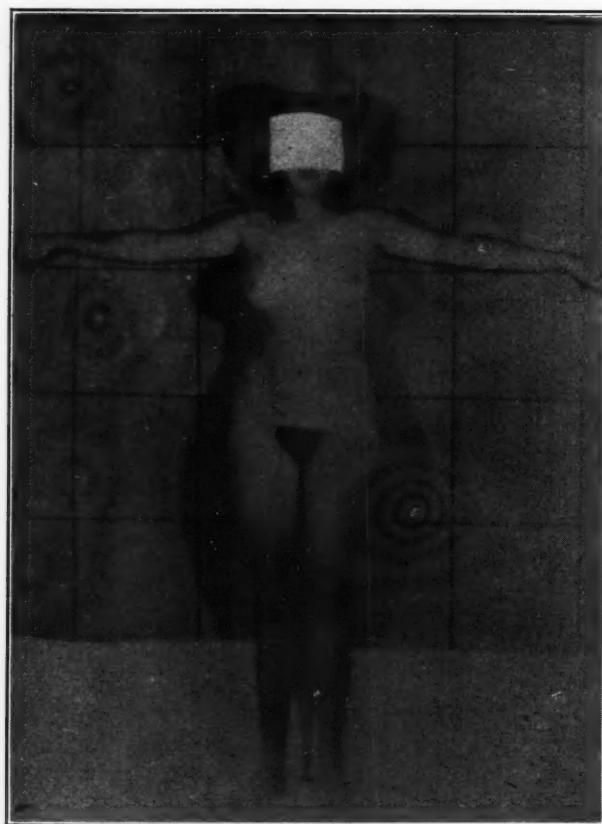


Fig. 3.—A hypergonadal case showing advanced secondary sex characteristics.

sification, as follows. There were three Class II, division 1. There were eight Class I, each with width deficiency and a crowding of the incisors. There were two Class I with protrusion of maxillary incisors only. There was one Class I with width deficiency of both arches and a double protrusion. There was one Class I with a deficient forward growth of the premaxilla only. There was one Class I with a deep overbite only, leaving six with efficient functional occlusion.

## BREAST FEEDING

The history on breast feeding was given on twenty of the twenty-two cases. One gave a history of breast feeding for a period of three years, one for a period of four years and one for a period of two and one-half years. The remainder were breast fed for a period of ten to fourteen months. The significance of breast feeding was negative in this group of people.

## ADENOIDS AND TONSILS

Of the twenty-two cases only one gave a negative history regarding adenoids and tonsils. Only one, by history or clinic findings, was a mouth-breather. Eleven were found to have both adenoids and tonsils at the time of their physical examination. Nine gave a history of having had both adenoids and tonsils removed previous to our examination. The nonpotency of adenoids and tonsillar influence upon jaw and arch growth has been amply dealt with in a previous article.<sup>4</sup>



Fig. 4.—Radiogram of hand of patient in Fig. 3, showing an unusual advancement in epiphyseal union.

## CONCLUSIONS

Our present explanations for perverted growth of the jaws and arches do not prove correct in the light of investigative evidence. Intrinsic or hormonal factors predominate in directing growth whether the field of study be in the facial region or in any portion of the skeletal make-up.

In the light of present knowledge concerning the ductless glands, these growths inharmonies accompanying hypogonadal individuals may not actually be directly responsible for the absence of the sex hormones, but through the known compensatory action of the anterior lobe of the pituitary body (as well as others of the ductless gland group), these latter may be the direct cause of growth disturbance.<sup>5, 6</sup> To say the least, the close interrelationship of the

TABLE I

CASE NUMBER	AGE	SEX	BOTTLE OF FED	BREAST OF FED	ADENOID TONSILS	HEIGHT	LONG BONE SPAN	TORSO LENGTH	DISPROPORTION IN PAVOR OF LONG BONE	BREATHING MOUTH	ORTHODONTIC SURVEY OF THE GROWTH OF THE DENTAL ARCHES AND JAWS		SEX CHARACTERISTIC
											Menstruation began at age 17	Total absence menstruation	
1606	19	F	Br	Br	Out Age 18	111	63	65 $\frac{3}{4}$	33	+3	Neg.	Normal	
1640	16	F	Br	Br	Out Age 4	90	574	55	27 $\frac{1}{4}$	29 $\frac{1}{2}$	-1 $\frac{1}{2}$	Neg.	Class I, narrow maxillary laterals
1647	16	F	Br	Br	Out Age 8	93	53 $\frac{1}{2}$	57	27	26 $\frac{1}{2}$	+ $\frac{1}{2}$	Neg.	Normal
1648	19	F	Br	Br	Out Age 14	118	62	65	32	30	+2	Neg.	Class I, deep overbite
1576	16	M	Br	Br	Out Age 11	89 $\frac{1}{2}$	58	60	30	28	+2	Neg.	Double protrusion, deficient growth of mandible
1568	18	F	Br	Br	Not out	97 $\frac{1}{2}$	63 $\frac{1}{2}$	70	35 $\frac{1}{2}$	28	+7 $\frac{1}{2}$	Neg.	Class I, deficient width both arches
1537	17	F	Br	Br	Out Age -	91 $\frac{1}{4}$	59	61 $\frac{1}{4}$	30 $\frac{1}{4}$	28 $\frac{1}{4}$	+1 $\frac{1}{2}$	Neg.	Class II, division I, open-bite
1503	14	M	Br	Br	Not out	77	56 $\frac{1}{4}$	55	30	26 $\frac{1}{4}$	+3 $\frac{1}{4}$	Neg.	Normal
1289	14	M	Br for 4 yrs.	Br for 3 mo.	Not out	88	59 $\frac{1}{2}$	60	31 $\frac{1}{2}$	28	+3 $\frac{1}{2}$	Neg.	Deficient forward growth of premaxilla
1276	13	M	Br for 2 $\frac{1}{2}$ yrs.	Br for 2 $\frac{1}{2}$ yrs.	Out Age 11	58	56 $\frac{3}{4}$	54 $\frac{1}{2}$	30	26 $\frac{1}{4}$	+3 $\frac{1}{4}$	Neg.	Class I, arch width deficient
1156	14	F	Br for 2 $\frac{1}{2}$ yrs.	Br for 2 $\frac{1}{2}$ yrs.	Not out	65	53	54	28	25	+3	Neg.	Class I, deficient arch width
													Sex organs juvenile
													Sex organs juvenile
													Sex organs juvenile
													Sex organs juvenile

TABLE I (CONT'D)

CASE NUMBER	SEX	WEIGHT	ADENOIDS AND TONSILS	SPAN	LONG BONE LENGTH	TORSO LENGTH	DISPROPORTION IN FAVOR OF MOUTH	BREATHING MOUTH	ORTHODONTIC SURVEY OF THE GROWTH OF THE DENTAL ARCHES AND JAWS		SEX CHARACTERISTIC
									CLASS I, DEFICIENT ARCH WIDTH	CLASS I, DEFICIENT ARCH WIDTH	
466	Br	90	62 $\frac{3}{4}$	66 $\frac{1}{2}$	33 $\frac{1}{4}$	29 $\frac{1}{2}$	+3 $\frac{3}{4}$	Neg.	Class I, deficient arch width	Sex organs juvenile	
732	F	Br	Neg.	..	70 $\frac{1}{2}$	38 $\frac{1}{2}$	32	+6 $\frac{1}{2}$	Neg.	Sex organs juvenile	
916	M	Br	Not out	61	66	33	28	+5	Neg.	Menstruation total absence	
281	F	Br	Not out	136	..	..	..	..	..	Menstruation total absence	
299	F	..	Not out	..	66	66 $\frac{1}{2}$	36	30	+6	Menstruation total absence	
396	M	Br	Not out	86	60 $\frac{1}{2}$	63 $\frac{3}{4}$	33 $\frac{1}{2}$	27	+6 $\frac{1}{2}$	Sex organs juvenile	
431	F	..	Out Age 17	68	70	36 $\frac{1}{2}$	31 $\frac{1}{2}$	+5	..	Menstruation very irregular	
603	M	Br	Not out	91	58	57	31	27	+4	Sex organs juvenile	
1825	M	Br	Out Age 3	91	63 $\frac{1}{2}$	62 $\frac{1}{2}$	32 $\frac{1}{2}$	31	+1 $\frac{1}{2}$	Sex organs juvenile	
1805	M	Br	Not out	124	59	61 $\frac{1}{4}$	31	28	+3	Sex organs juvenile	
1718	M	Br	Not out	71 $\frac{1}{4}$	47	49 $\frac{1}{2}$	23	24	-1	Sex organs juvenile	
1702	F	Br	Out Age 5	106	64 $\frac{1}{4}$	67	34	30 $\frac{1}{4}$	+3 $\frac{3}{4}$	Sex organs juvenile	
									..	Menstruation total absence	

Note.—A study of the above table will give information in addition to that especially stressed in this report.

several known internal secretory glands makes it difficult to assign the different phases of a physical picture to any one particular gland.

Concerning the skeletal disproportion, two questions may be pertinent: First, is the excess length of the long bones due to an abnormal acceleration in growth? Second, are the long bones normal, or is the torso retarded in growth? In the first instance, the hormones were active in producing long bone growth; in the second instance, they were influential in combating torso growth. A correct analysis of this phase of growth will probably never be definitely proved.

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#### MECHANICAL THERAPY IN ORTHODONTIA AS INDICATED BY THE GROWTH AND DEVELOPMENT OF THE DENTAL ARCHES OF CHILDREN\*

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THE special study of growth and development would primarily indicate a reconsideration of the orthodontic problem from the biologic standpoint with the idea of reviewing some of its more important phases and stressing its value in diagnosis and prognosis, and in a correlated therapy.

Mechanical therapy in orthodontia, by its very nature, must be purely relative to the biologic factors involved in malocclusion, and it is largely the factors concerned in the growth and development of the entire organism, and the jaws and dental arches in particular, which interpret this relation and determine the nature and value of its therapeutic application, especially in the incomplete dentition and the growing dental arches of children.

As a beneficial therapeutic agent in orthodontia, especially in its application to the dental arches of children, mechanical therapy bases its claims on the possibility of control or correction of certain inhibitions, retardations, or even arrested conditions in growth of the dental arches by means of mechanical appliances attached to the teeth, and the further improvement in the growth and development of the dental arches through the functional use of the muscles attached to the jaws.

With this in mind we may define an orthodontic appliance to be used for the application of mechanical therapy as follows: An orthodontic appliance is a mechanism attached to the teeth in an effort so to change their relation to

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their investing and supporting osseous structures that inhibitions in growth may be stimulated and a better occlusal relation established which will enable the jaws and dental arches to function in harmony with the normal stresses and habits of the muscles attached to the jaws, and in accord with their inherited and environmental possibilities in growth and development.

The dental arches of the child are in a continual transitory process of growth and development, and the application of mechanical appliances should only be made during the particular stage in which interference with certain aberrant growth conditions is judged to be necessary.

Orthodontic appliances are like crutches, which serve their purpose during a temporary disability on the part of the body to support itself, and are then discarded as soon as the body is again able to support itself, after the disability disappears.

In the malocclusions of children the orthodontic appliance must sooner or later be discarded in favor of Nature's own developmental processes when it is found that she can continue them under her own functional direction without further interference.

It is therefore of prime importance to the orthodontist to distinguish between the active and the latent periods of regional development of the dental arches so that he may apply mechanical therapy when natural growth in a region of retarded growth is most active and not during an apparent rest period. A brief review of some of the most active growth periods of the dental arches may assist in giving one a clearer picture of these growth phenomena.

"In studying the development of individual organs or groups of organs it is but natural and logical to consider their developmental history as being influenced by two distinct periods, first of which is concerned with their formation prior to the establishment of function, and the other the period of differentiation and growth which follows and is dependent upon function."<sup>1</sup>

Russell remarks, "The first period is one of self-differentiation in which the parts are formed in anticipation; the second period is one of functional development in which the organs are perfected through functioning, and only through functioning. The first period includes the directly inherited structures, growth and development taking place before they began their specific function. The second period includes the further differentiation and maintenance in their typical form of the parts laid down in the first period, and as brought about by the specific function of the part. This period brings to pass the finer functional harmonies of the organism."<sup>2</sup>

The dental arches are just as much subject to these prenatal and postnatal influences as are any other structures in the human organism, and it will behoove us to make some observations as to growth and development in the embryonic or prefunctional period which have some bearing on growth conditions in these structures after birth in their functional period when mechanical therapy is available if necessary.

In Fig. 1 is illustrated an embryonic skull, at about the seventh month of fetal life, which exhibits the laying down of the foundation for the most intricate architectural structure in the human organism, the dental arches, predestined and geometrically designed for the mechanical function of occlusion

in mastication, and including within themselves the functional mechanism whereby their growth and development is to a large extent controlled after birth.

The first and most important influence of development during the prenatal period and continuing during the postnatal period is that predestined indelible stamp of heredity upon the form and type of the dental arches, and which, to a certain indeterminate extent, controls and modifies their growth.

Dr. Lewellys F. Barker has stated that "hereditary factors are largely determinative not only of the cell metabolism of the tissues immediately concerned in the development of the teeth but also of the cell metabolism of all of the structures of the head, as well as that of the nervous system and of the endocrine system, systems which, though far removed from the teeth and jaws, exert a profound influence upon the character and the rate of development of the latter."<sup>3</sup>

Referring to a statement by Dr. John Mershon that "The unseen things in orthodontia are infinitely more important than the visible,"<sup>4</sup> I would place



Fig. 1.

these mysterious factors of heredity which influence growth and development of the dental arches as among the invisible determinants which are of far greater importance than those which can be macroscopically observed.

One of the easily observed phenomena in the fetal skull (Fig. 1) is the bulging of the crypts for the developing deciduous teeth exhibiting a greater temporary growth in the alveolar portions of the maxilla and mandible in prenatal anticipation of the function of occlusion in the act of mastication of food necessary for the sustaining of life.

The dental arches at this stage of fetal life are all tooth crypts with little supporting structure, as is shown by the thinness of the lower part of the mandible in its skeleton-like architecture, and the undeveloped ramus, these parts awaiting the initiation of their functional use after birth for stimulus to their further growth and development.

Nature's early preparation for and building of this superalveolar structure containing the crypts of the deciduous teeth at the temporary expense of growth of adjacent structures of the maxilla and mandible exhibits one of the first macroscopically observable regions of "alternate growth" periods during the growth and development of the dental arches, beginning in embryo and con-

tinuing after birth in various alternate growth regions which I wish to emphasize at this point. For, what at one stage of growth may appear to be retardation of development, will at a later stage be equalized in harmony with the rest of the growth of the jaws.

Ballantyne says, "No period of nine months in childhood, in adult age, or in old age is so replete with occurrences so diverse in kind and of such far reaching importance as is spent by the unborn infant *in utero*."<sup>5</sup> Dr. Milo Hellman makes the following comment in this respect, "If we should examine the countless modifications that a developing organism passes through from inception to parturition, and realize the underlying conditions bringing about these remarkable transformations, until the completion of an individual, we shall not wonder that a malformation may appear now and then, but we shall be surprised that such disturbances are not the rule instead of the exception."<sup>6</sup>

From our all but too vague knowledge of the various morphologic changes of a genetic or pathologic nature which may happen to the developing dental arches in embryo it is quite certain that the application of mechanical therapy

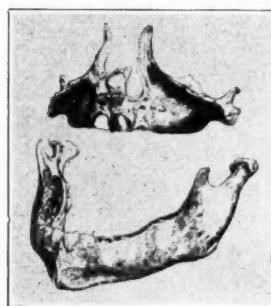


Fig. 2.—Infant jaws at nine months (Tomes).

for the correction of these genetic changes will be of little or no avail during childhood.

The second period of differentiation in the developmental history of the dental arches begins almost immediately after birth when mammary function and respiration add their functional influence to the growth and development of the infant dental arches. A few months after birth, as shown in Fig. 2, the inequality of growth of the alveolar portion of the dental arches which was so much in evidence becomes more equalized, the body of the maxilla and mandible sharing in the increased growth which appears with function.

However, another inequality of growth is next noted in the group eruption of the deciduous teeth in the incisor region in which the added growth of alveolar bone is observed. Successively the group eruption of the other deciduous teeth adds growth to the alternate regions where each group is erupted until the deciduous dentition is complete.

In this period of from the second to the fifth year the deciduous dental arches, Fig. 3, have grown in three dimensions in response to their functional use and that of the related muscles. The face has shared in this three dimensional growth at the same time, and in the skull in the illustration at the age of five years is about one-fourth the size of the cranium.

In considering the possibilities of stimulation of growth by appliances in mechanical therapy, it complicates the problem somewhat to observe that growth of the face is not uniform in the three directions that it is possible to grow. Dr. Milo Hellman remarks, "What is not generally known is that when the face grows much in one of the three directions it grows less in the other two; i. e., growth alternates. \* \* \* Moreover, it is now known that the face grows more in depth than in height and it grows more in height than in width. But what is of importance is to understand also that growth of the face does not take place continuously. It occurs in spurts. In other words, growth is sometimes abundant and sometimes scant."

"The phenomena of retardations and accelerations in the process of development are usually either not known or entirely ignored."

"Scientific evidence, however, is now rapidly increasing in support of the observed fact that many children showing insufficient or unsatisfactory development of certain facial or dental features during a period of retardation tend



Fig. 3.

to regain this setback by a spurt of growth occurring at a later period of acceleration."

"This situation has brought about two contrasting viewpoints with regard to the greatest benefits to be derived from orthodontic treatment. According to one viewpoint, malocclusion of the teeth is a phenomenon belonging to the domain of pathology. If not corrected at once, it will give rise to sequelae which are detrimental to health and life. According to the other, malocclusion of the teeth is a phenomenon belonging to the domain of those natural events which constitute development. If not interfered with at its earliest stages, some individuals will come through all right. The others have to be carefully watched until it is reasonably certain that the natural processes of development have definitely failed."<sup>7</sup>

According to these observations the orthodontist would be wise if he gave Nature the benefit of the doubt in many incipient cases of malocclusion and placed these cases under observation only until such time as he could definitely determine that the inhibition or retardation in growth and development of

the dental arches necessitated the assistance of mechanical therapy for its stimulation to further growth.

While there are some cases of malocclusion in the child dentition which seem to have a pathologic background, by far the greater number may be recognized as only temporarily aberrant or retarded stages of growth and development of the dental arches, which, although possibly needing mechanical assistance at the moment, might, if left alone and not interfered with, make up their lack of growth and complete their development to the maximum prescribed by their own limitations of functional adaptation and inherent growth possibilities.

With these observations in mind, let us survey the field of child malocclusions, and by a division of the more definite functional periods, make an appraisal of the necessary or unnecessary interference by mechanical therapy according to the conditions of aberrant growth or development which are exhibited in these periods.

There are three periods of child dentitions in which the application of mechanical therapy may or may not be advisable but which are somewhat differently appraised according to the growth conditions found to be present, as follows:

1. The deciduous dentition period.
2. The mixed denture or transition period of occlusion.
3. The completion of the permanent dentition (except third molar).

#### THE DECIDUOUS DENTITION PERIOD

Malocclusions of the deciduous teeth are not uncommon, and the application of mechanical therapy between the age of four and one-half years when the roots of these teeth begin to absorb, will often prove of advantage in certain cases in aiding future growth and development of the dental arches, and prevent a conformation of the osseous structures and facial lines to malformations due to malfunction.

Some of these inhibitions in growth and development of the deciduous dental arches are evident at an early age, and exhibit the mechanical locking of the teeth in malocclusion which necessitates mechanical therapy of the simplest nature for its correction.

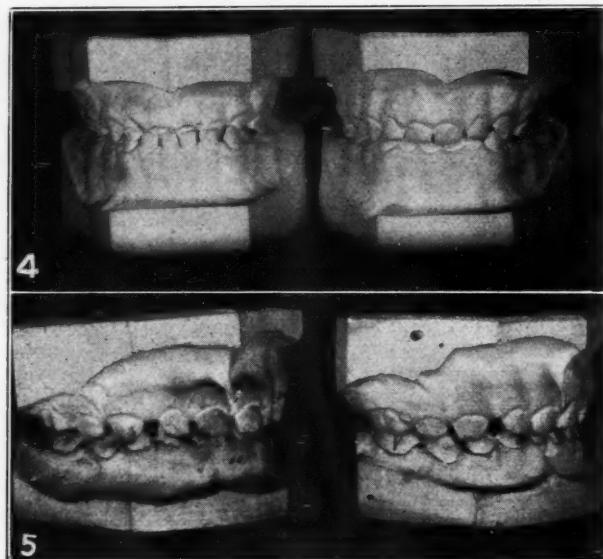
Especially is this true of the linguoversions, anterior, unilateral or bilateral, and the labioversions of Class I (Angle), or of the neutroclusions, and the distooclusions and mesiooclusions, Class II and III (Angle), observable in the deciduous dental arches.

Mechanical therapy in these deciduous malocclusions produces the best results before the roots of the deciduous teeth in malocclusions begin to absorb, preferably between the ages of three and four and one-half years. If treatment is begun during the period of root absorption, the effect of post function is lost, the erupting permanent teeth are less influenced and may erupt into the same lingual positions in the linguoversion cases, necessitating carrying the mechanical therapy over into the mixed denture period.

Fig. 4 exhibits an anterior and lateral linguoversion of Class I (Angle), treated at the age of three and one-half years, when the roots of the deciduous incisors and canines are still unabsorbed and capable of retaining the crowns

in their new positions of occlusion after treatment until their permanent successors erupt. Normal functional forces are quickly initiated and an opportunity is given for the dental arches to grow and develop under normally directed stresses as soon as the linguoversion is corrected by mechanical therapy.

Maxillary protrusions or protractions in the neutroclusion class of deciduous dentitions, unless complicated by the deep underbite, should be corrected by mechanical therapy before the age of four and a half years in order to anticipate the root absorption period and also to institute psychologic or mechanical therapy early for the correction of thumb-sucking or lip-biting habits which are usually found associated with this class of malocclusions. In excepting the deep underbite cases exhibiting maxillary protrusions in the neutroclusion class from treatment during this period, although the maxillary incisors might be



Figs. 4 and 5.

moved lingually to an improved alignment as in Fig. 5, any attempt to depress the mandibular incisors to correct the occlusal plane might injure the developing permanent incisors and canines.

It would seem to be good judgment to allow this class of cases of deciduous malocclusions to await the eruption of the first permanent molars and the permanent incisors before attempting mechanical therapy in the assistance to normal growth and development of the dental arches.

The same advice to delay mechanical therapy until the eruption of the first permanent molars and the permanent incisors holds good for the deep underbite cases of Class II, division 1 (Angle) for the same reason. However, in this class of cases in which the deep underbite is not present, as illustrated in Fig. 6, in a child of three and a half years, mechanical therapy in the correction of the distoclusion after getting rid of the lateral interferences can only assist in directing a more normal growth, initiate a new habit position of occlusion of the teeth which tends toward the normal while the functional stresses adjust themselves to operating in more nearly normal lines.

Again a habit, such as thumb-sucking which was present in this case, may be corrected before it becomes confirmed by too long standing at the same time the malocclusion is corrected.

Furthermore, the extent to which hereditary predisposition to a distoclusion is predominant, as in this case, may also be determined by the degree of response to mechanical therapy, it being assumed that the extreme symptoms of deformity as exhibited by the malocclusion and faulty facial lines may, through abnormal muscle pull and occlusal stresses, extend beyond the hereditary inclination.

Fig. 7 illustrates the improvement in facial lines after treatment for one year of the case shown in Fig. 6, and, while the abnormal relations of the dental arches may reappear in the mixed denture, a great improvement over the

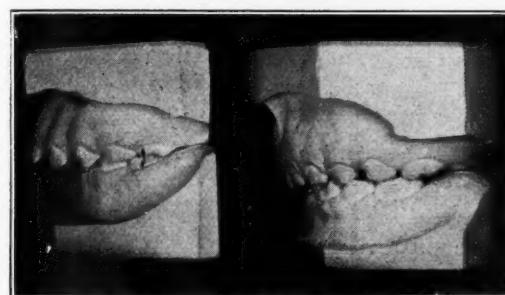


Fig. 6.



Fig. 7.

original condition from early treatment by mechanical therapy may reasonably be expected.

In the mesioclusion cases of deciduous malocclusions I can see no reason why mechanical therapy in the attainment of more normal occlusal relations, as in Fig. 8, should not be inaugurated either before root absorption of the deciduous incisors, during, or after the beginning of eruption of their permanent successors, as most of the pressure stimuli is applied to the maxillary deciduous or permanent molars where there is little danger from harm to any tissues through the use of intermaxillary force delicately applied from a mandibular arch where the teeth are used en phalanx in anchorage.

Generally speaking, malocclusions of the deciduous dentition which do not involve a change in the occlusal plane and which will be improved in their func-

tional occlusal adjustment by means of mechanical therapy, should be selected for treatment during this period. Cases which involve a change in the occlusal plane invite possible injury to the unerupted permanent teeth through undue pressure by mechanical treatment, and the defective occlusal plane observed in the deciduous dentition will reappear again in the second dentition in spite of any kind of attempted mechanical therapy for its correction. In other words, its abnormal form and type cannot be suppressed by treatment of its earliest observable tendency in the deciduous dentition.

Treatment of cases involving occlusal adjustment without having to consider any change in the occlusal plane is restorative of normal functional condi-

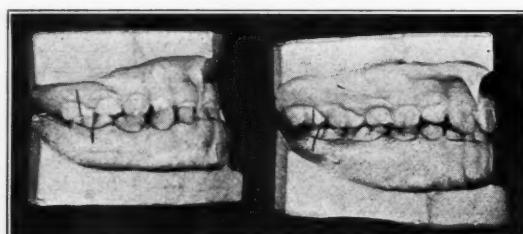


Fig. 8.

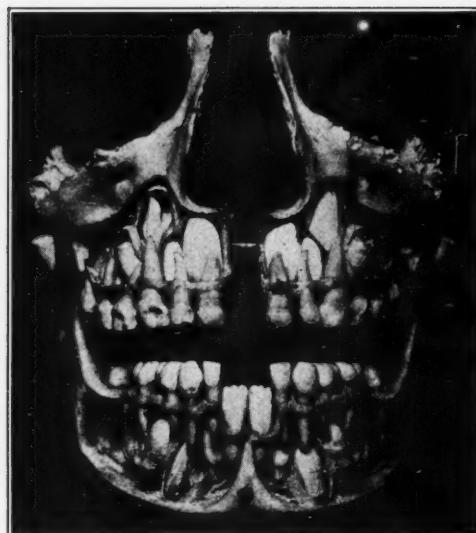


Fig. 9.

tions of occlusion which can only assist in the normal growth and development of the deciduous and permanent dental arches with occlusal stresses in the planes in which Nature intended them.

#### THE MIXED DENTURE PERIOD

With the beginning of the eruption of the first permanent molar and the mandibular central incisors, Fig. 9, the mixed denture or transition period of occlusion is well under way, initiating a period of the most active bone resorption and rebuilding, the alveolar bone being torn down in one region while it is being built up in another according to the chronologic group eruption of the permanent teeth.

The intervals of growth and rest periods, except for the average approximate dates of eruption in groups of the permanent teeth, are indeterminable so that it is almost impossible to judge the most advantageous beginning periods of alternate growth or of growth coinciding with tooth eruption periods, and apply mechanical therapy at these times synchronously with this growth, when it seems to be of the greatest advantage.

If mechanical therapy is applied some little time before the time for the eruption of a permanent incisor, growth will not be thereby initiated but will come only when in the cycle of growth periods, the group of teeth to which the incisor belongs is due to erupt in the particular individual and the surrounding alveolar structures are to grow synchronously. It is better to apply mechanical therapy even a little later than the beginning of the period of the group eruption of the teeth than to attempt "to grow the jaw," so to speak, in advance of these periods.

One of the simplest cases of malocclusion of the mixed denture period about which the orthodontist is often in doubt as to whether he should imme-



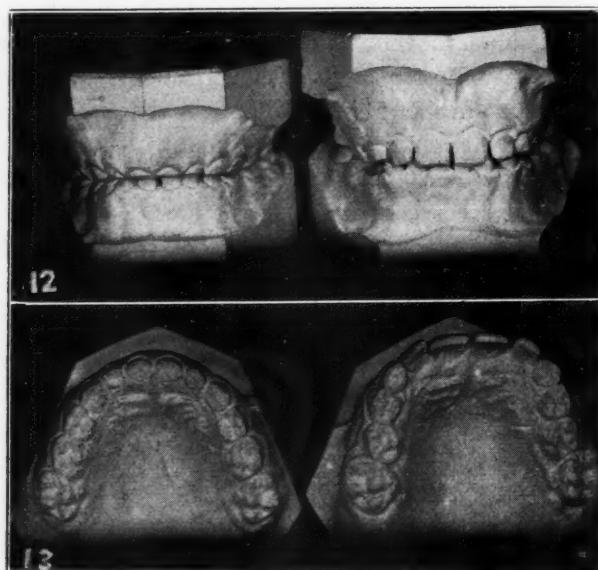
Figs. 10 and 11.

diately apply mechanical therapy for its correction is the linguoversion of mandibular incisors caused by the prolonged retention and lack of root absorption of their deciduous predecessors, as shown in two cases in Fig. 10.

The first step in this type of case is, of course, the extraction of the too long retained deciduous incisors, and nothing can be lost by initiating a succession of observation periods a few months apart to see whether Nature will not correct the malocclusion unaided, except by tongue pressure, in this region. If a sufficiently long interval shall elapse without enough growth in the incisor region to permit alignment of the incisors in linguoversion, there is still plenty of time to initiate mechanical therapy to stimulate further growth in this region before the eruption of the permanent canines which initiate a new period of adjacent growth laterally.

An example of too early application of mechanical therapy to widen spaces for prematurely lost deciduous canines in anticipation of stimulating growth for later to be erupted permanent canines is shown in Fig. 11. The ease was that of a child seven years of age when appliances were placed on the mandibular

arch to secure lateral and anterior growth and particularly growth in the canine regions in anticipation of their later eruption. The cast on the right shows that anterior and lateral tooth movement was obtained, but the anticipated growth in the canine region was not forthcoming, the gums exhibiting a depressed curve in that region as if it were stretched. If one should stop to think that the canines could not erupt earlier than nine years and might be delayed until ten or eleven years, with alveolar growth in this region appearing only at



Figs. 12 and 13.



Fig. 14.

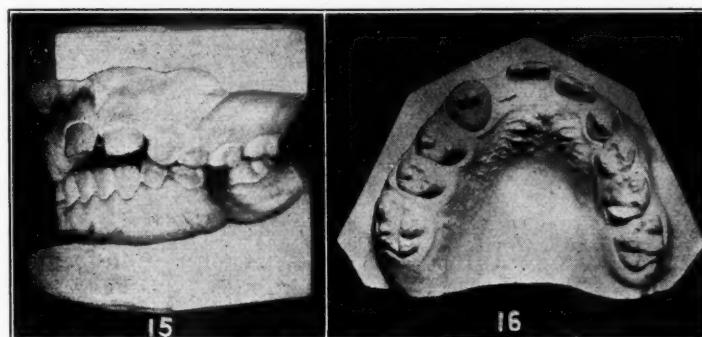
the time of eruption of these teeth, the reason for the lack of growth at seven to eight years of age in this region would be evident.

It would have been better to have waited until the beginning of the growth period in the canine region before attempting mechanical therapy for stimulating growth in this region when it could have been more nearly synchronized with the natural growth coincident with the eruption of the canines.

On the other hand, in a case of retention of all of the deciduous maxillary incisors beyond the age of eight years, Fig. 12, it was deemed advisable to apply mechanical therapy immediately to furnish a pressure stimulus which

would initiate the delayed processes of root absorption of the deciduous incisors and facilitate growth in the incisor region. The after treatment casts of the maxillary arch in Fig. 13 exhibit the results of this treatment.

One of the indices of normal growth conditions in the incisor region on which the orthodontist once placed considerable reliance is the spacing between deciduous incisors some little time previous to the eruption of the permanent incisors, as illustrated in Fig. 14.



Figs. 15 and 16.



Fig. 17.

On account of the variability of these growth processes in different individuals the orthodontist is content to wait until these spaces materialize at a later date or even until the permanent incisors erupt during an observation period rather than immediately to apply mechanical therapy for stimulating these growth processes which Nature may herself initiate at a little later period.

It would be of great value in our study of growth and development if we understood better the metabolic processes of normal growth, especially as to the influence of nutrition, and the nervous and endocrine systems, for it is possible that we might trace to their sources the particular malign influence in maladjusted growth processes so commonly noted in malocclusion.

It would be even more intriguing to ascertain the cause of overstimulation of metabolic processes such as would cause overgrowth of one-half of a maxillary arch and normal growth in the other, as shown in Fig. 15.

On the overgrown right half of the maxillary arch, Fig. 16, the permanent premolars and canine are erupted, indicating an age of ten or eleven years, while on the left half the deciduous canine and molars indicate an age three or four years younger, or the age of the child, seven years. Even the right canine itself is overdeveloped, and the right half of the maxilla exhibits the lateral overdevelopment of this half of the dental arch in the horizontal growth.

The right side of the face, Fig. 17, also shows the effect of overgrowth in the redundancy of the lip and the fullness of the cheek on that side. Photographs of this case were sent to Yale Medical School for an opinion as to whether this overgrowth might have been caused by endocrine disturbance. A negative report was received, and the cause could not be definitely ascertained.

There is a patient in one of the Buffalo hospitals who has overgrowth in the length of one leg. In this case the cause was found to be an excessive arterial supply to the longer leg due to the crossing of a fairly large artery from the main artery to one of the larger veins returning from the foot about midway of the leg, thus unbalancing the arterial supply and venous return so that there was an excess of arterial blood to the foot and lower leg bones with little if any venous return.

In the prognosis of any case of malocclusion the possibilities of growth and development of the dental arches should be one of the first and most important considerations, for clinical experience and observation of the growth tendencies or otherwise in a large number of cases of malocclusion in children will reveal the fact that in certain cases the normal growth tendencies are more pronounced than in others, as noted macroscopically and confirmed by the clinical health history, which may show a possible tendency to either a normal or an inhibited growth of the dental arches.

The more favorable prognoses are always made in those cases exhibiting the normal growth tendencies, and the less favorable in those cases showing a lack of them before the application of any kind of mechanical therapy, and regardless of it.

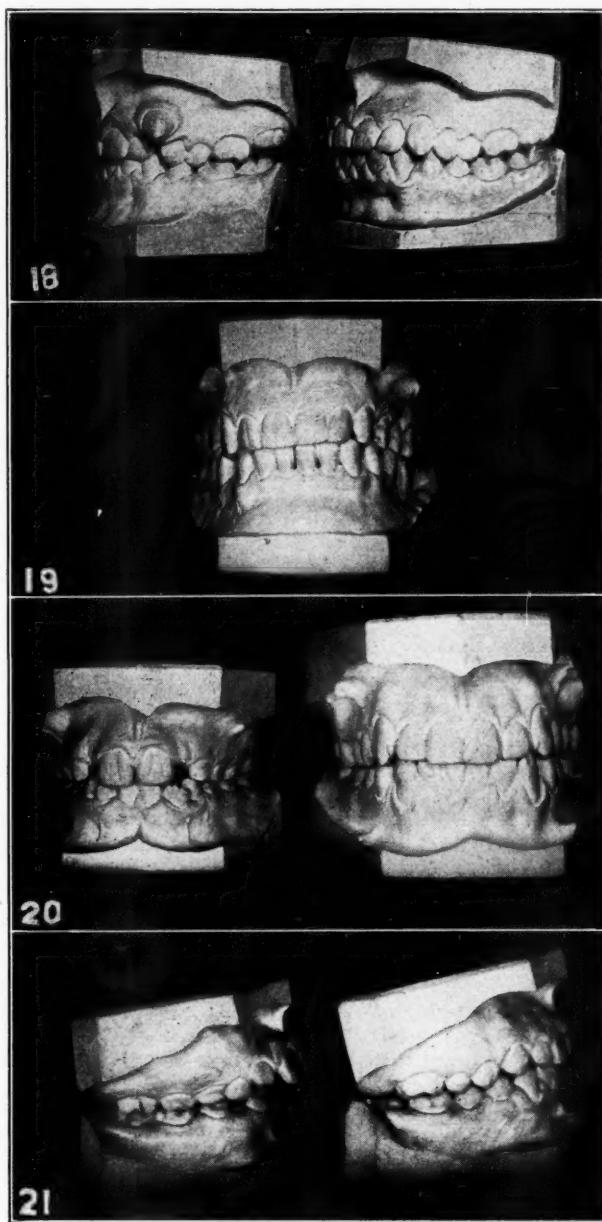
In my own clinical experience the most pronounced cases showing the lack of normal growth tendencies in malocclusions of children are those associated with nasal stenosis, narrow nasal meati, and lack of development of the middle third of the face, including the maxilla.

The late Dr. J. Lowe Young made a very significant statement in regard to children exhibiting a distinctly observable lack of normal growth conditions when he remarked, "It is doubtful if children once affected by lack of growth to an observable degree ever entirely overcome such defect. It is questionable if it is possible by any means, mechanical or otherwise, to stimulate growth so that no effects of the disturbance remain. We, therefore, should be careful about promising to establish normal occlusion or to obtain perfect results. The earlier in life such defects in growth are recognized and properly treated, the greater are our chances of success. Mechanical appliances on the teeth cannot be expected to correct malnutrition or impaired metabolism."<sup>18</sup>

On the other hand, in the dental arches of children exhibiting only slightly impaired growth tendencies, especially when backed up by an apparently good inheritance, from one or both parents, normal growth tendencies during the

application of mechanical therapy may be expected and will finally bring these cases through to a permanently successful culmination in growth and development of the dental arches.

I should like to illustrate this situation exactly by the cases of maloclusion



Figs. 18-21.

and normal occlusion in a family, various members of which have been under my care for more than thirty years.

Fig. 18 exhibits the serious neutroclusion of the father in 1901. The maloclusion was corrected but failed of perfect retention so that one of the maxillary canines had to be extracted by the family dentist, although without

my advice. The appliances used were immaterial although plain expansion arches and ligatures were applied in those early days. Fig. 19 illustrates the nearly normal occlusion of the mother some years after her marriage, but the casts exhibit unusually well-developed dental arches and only slight malocclusal tendencies.

The son's malocclusion, Fig. 20, at seven years of age, reflected a tendency to reproduce that of the father if allowed to remain in a state of retarded growth without mechanical therapy, so that appliances were adjusted, in this case the lingual arches, to correct the malocclusion by attempted stimulation of growth of the dental arches, with most gratifying results, as shown in the after treatment casts.

It was noticed, in addition to obtaining an occlusion which was nearly normal and which was self-retaining, that normal growth influences, although insufficient, were at all times evident during the therapeutic mechanical treatment, so that there were no long delays for growth to be initiated at the proper times for group eruption of the teeth.

In regard to the application of mechanical therapy in the distoocclusions and mesioocclusions of the mixed denture period, it is of decided advantage to begin treatment of these cases as soon after the eruption of the first permanent molars and the incisors as possible in order to direct the growth of the dental arches into normal lines through establishing proper occlusal and functional relationship, to correct bad muscular habits and to inaugurate good ones, as well as to prevent a more difficult malocclusion and abnormal muscle relation through a longer period of conformation and noninterference.

Fig. 21 illustrates the case of a nine-year-old child with dental arches in distoocclusion in which mechanical therapy was applied at this early age and at intervals, with periods of rest under intermaxillary retention for natural growth of the dental arches under their own occlusal and muscular function.

It is even more necessary to apply mechanical therapy in the mesioocclusion cases of the mixed denture period in order to direct the abnormal growth of the dental arches toward normal lines at an early age, as the tendency to confirmation of the deforming abnormal functional stresses is much greater than in the distoocclusion cases.

#### THE COMPLETION OF THE SECOND DENTITION PERIOD

Malocclusions presenting immediately after the eruption of all of the permanent teeth except the third molars may still be considered as malocclusions of childhood and are symptomatic of retarded growth which will respond to the application of mechanical therapy at this time much more than a few years later.

Bodily growth is going on a little more rapidly at this period, and the jaws and dental arches share in the general growth of the whole organism.

The old adage in medicine that "function produces structure" is as true in the orthodontic field as it is in general orthopedia, of which orthodontia is a distinct branch, and it is to the restoration of the balanced functions of the muscles of the jaws and face that all mechanical therapy in the child denture must be subservient eventually.

Someone has said that all the mechanical devices in use by man today have their counterpart in the muscular mechanisms in the human body, of which there are more than three hundred examples. Looked at in this light the muscles as "living orthodontic appliances," as designated by Dr. Alfred P. Rogers, might be included as agents for growth and development under the heading of mechanical therapy, distinguished as naturally applied forces rather than artificially applied mechanisms.

Dr. Rogers makes the following distinction, "It is quite true that the possibilities of mechanical apparatus may be imagined or predicted because they are definitely limited in action, but the possibilities of the 'living orthodontic appliances' may as yet be only imagined, and, although the light is beginning to brighten, their possibilities must at the present time be considered unpredictable because of their hidden potentialities which not one of us is able even to guess correctly in respect to a given individual."<sup>9</sup>

In conclusion, let me state that mechanical therapy in the use of artificially applied mechanisms, and assisted by the functional use of the muscles of the jaws, through an initial understanding of the processes of growth and development of the dental arches, and a rational theory of application of forces which tend to stimulate growth and development, is a beneficent therapy in its application to the retarded growth conditions in the dental arches of children of varying ages if applied at the right time with proper intervals of rest, when the dental mechanism can best grow and develop under its own functional forces.

In this way, with the further assistance of collateral medical therapy in the attempted attainment of normal growth and development of the child as a whole, mechanical therapy may be said to be doing its share in the restoration of health and the attainment of beauty in a well-balanced physical organism of the normal child of today.

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## THE TREATMENT OF DISTOCLUSION CASES\*

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THE purpose of this paper is to consider the different types of malocclusion in which the mandibular first molar is in distal relationship to the maxillary first molar and the method employed in treatment of these cases.

Since the classification of malocclusion is at times confusing, rather than refer to these conditions as Class II, Division 1 or 2, I shall, for the sake of simplicity, describe the condition rather than refer to it under the current terminology.

I appreciate the inability of covering, in one paper, a subject which comprises the bulk of orthodontic practice. I appreciate the fact that the differentiation of cases of distoclusion is extremely difficult, and an analysis and a diagnosis cannot be made without the patient, because in this type, more than any other, it is necessary to have the patient for the profile view and the median line, as well as for all the characteristics. A diagnosis cannot be made from a set of models, because in a set of models one never has the whole picture as one has with the patient present. Therefore, of necessity, the descriptions will be brief, but I hope to present an analysis of the different types of these cases with the treatment for each of them.

In undertaking to prescribe a procedure in treatment, the first thing to realize is that the treating of any case is a series of variations and that the plan of treatment which one prescribes at first only indicates a stage in treatment. After one has finished that step, the case must be rediagnosed, and the plan of treatment must again be outlined, and one is then treating a new case.

The treatments presented are those which Dr. Mershon and I have used in our practice and have found successful. The entire approach to the problem is purely from the viewpoint of the clinician. Etiology will not be considered in the scope of this paper as we are concerned only with a diagnosis of the cases and the treatment of them.

From the time that Angle presented his classification of malocclusion to the profession, the relationship of the mandibular to the maxillary first molar has been accepted as the basis of classification. As a result, there has been difficulty in the classification of those conditions in which the mandibular first molar is in distal relationship to the maxillary first molar as a result of the maxillary first molar being mesial to its proper position to the face and cranium. In this paper, for the sake of clarity, the conditions in which there is a distal relationship of the mandibular to the maxillary first molar have been divided in the following manner:

1. Where the mandibular first molar is distal in its relationship to the maxillary first molar, with protruding maxillary anterior teeth.
2. Where the mandibular first molar is distal in its relationship to the maxillary first molar, with bunched or retruded maxillary anterior teeth.

\*Read before The New York Society of Orthodontists, March 11, 1931.

3. Where the relationship of the mandibular first molar is distal to the maxillary first molar, but where, by the relationship of the jaws and the facial profile, there is a mesial relationship of the maxillary molars rather than a distal position of the mandibular arch.

4. Where the mandibular first molar on one side, only, is distal.

5. Where the maxillary molar on one side has drifted mesial to the mandibular molar.

We shall consider what is called closed-bite cases so far as they pertain to distoclusion.

We shall discuss the treatment of distoclusion cases after the mesiodistal relationship has been corrected.

This division is a clinical one arrived at arbitrarily in order to simplify the presentation of treatment.

Let us consider the treatment of the first division, in which the mandibular first molar is truly distal in its relationship to the maxillary first molar and the protruding maxillary anterior teeth are present, the true Class II, Division 1, according to Angle. This case presents a typical picture familiar to all of us; the protruding maxillary incisor teeth, the lower lip resting between the mandibular anterior teeth and the lingual surface of the maxillary anterior teeth.

The position of the mandibular teeth in relation to the maxillary teeth in this division can be divided into three groups.

(A) Where there is correct curve in the mandibular arch and upon treatment it will result in a correct overbite.

(B) Where the mandibular anterior teeth are in supraclusion producing a closed-bite.

(C) Where there is a tendency to an opening of the bite.

The treatment is usually as follows. In this discussion we can only consider the typical cases and not all the numerous variations. It is our practice, in all types of distoclusion, to correct the mesiodistal relationship first. We find that by so doing we cut down the difficulties of our treatment very much.

We use as the first step in treatment, a maxillary labial and a mandibular lingual appliance. The mandibular lingual appliance fits accurately and in close contact with the mandibular anterior teeth. The maxillary labial appliance rests on the maxillary anterior teeth at the gingival third, using the stop soldered to the labial wire at the mesial end of the buccal tubes. Intermaxillary elastics are used from a hook soldered about the canine region on the maxillary labial appliance to a hook placed on the mandibular molar band.

We have standardized on the number six elastic band; we prefer to vary the pull by the position of the hooks rather than by the size of the elastics.

Let us now consider this type of case in reference to the mandibular arch. Where the mandibular teeth are in the normal curve or in slight supraclusion, upon the application of the intermaxillary elastics and the bringing forward of the mandibular teeth, the constant hammering of the mandibular incisors against the lingual surfaces of the maxillary incisors will readjust the incisor length, in most of these cases, to a correct overbite.

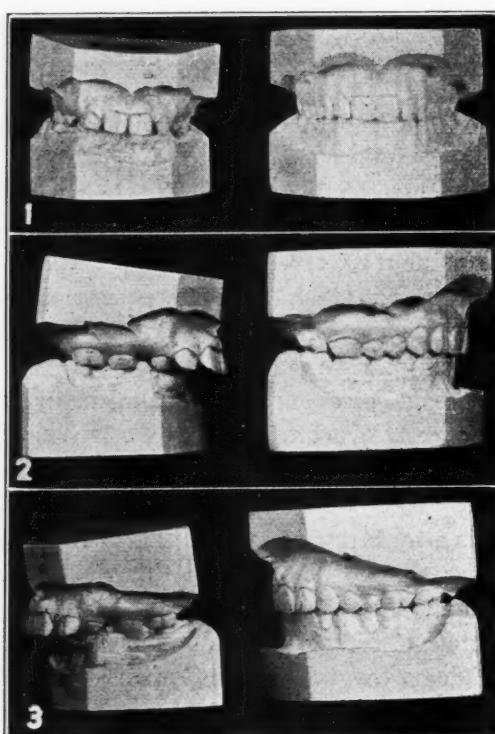
Figs. 1, 2, and 3 illustrate the type of distoclusion with protruding maxillary anterior teeth and with the mandibular anterior teeth in supraclusion, but

not sufficiently so at this age to make necessary special treatment for opening of this so-called closed-bite.

Fig. 1 shows the anterior view of the case at the beginning of treatment and several years after the completion of treatment.

Fig. 2 shows the right side view at the beginning of treatment and after completion of the case.

Fig. 3 shows the left side before treatment and after completion of treatment. The appliances used in this case were maxillary labial and mandibular lingual appliances. The overbite was never treated any further than by the



Figs. 1-3.

natural adaptive process of bringing the mandibular teeth forward with the intermaxillary elastics.

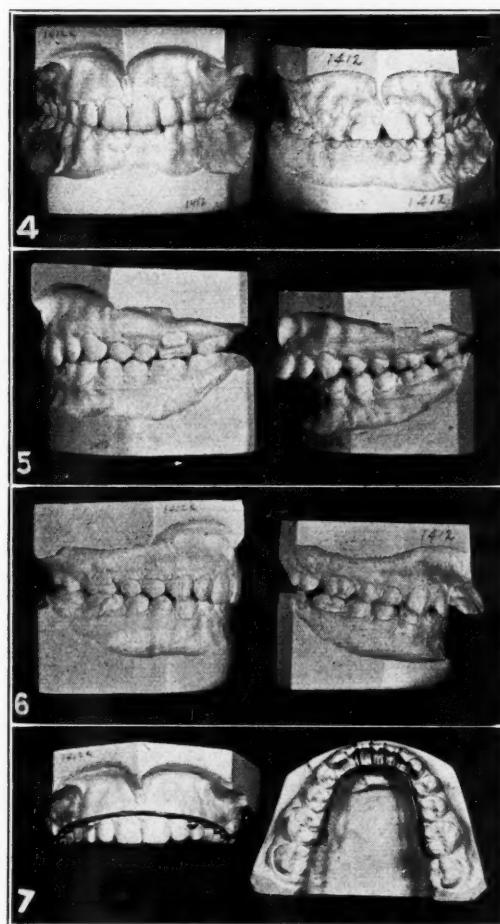
This is the type of case which many men start treating by using bite planes. We have never found bite planes necessary and have never used them in our office. We believe all that a bite plane ever does is to depress the mandibular anterior teeth, rather than to elongate the molars, as is commonly supposed.

Where we have a definite case of supraclusion of the mandibular incisors that is not corrected by the adaptive process of the mandibular teeth hammering against the maxillary teeth, these mandibular teeth must be depressed into their correct relationship before we can establish the correct mesiodistal relationship of the arches. This will be considered under closed-bite.

Fig. 4 shows the anterior view of a case in which the mandibular molars are distal and the maxillary anterior teeth are protruding with a supraclusion of the mandibular anterior teeth. The patient is of an age that we consider the

opening of the bite necessary, as the adaptive processes will not produce the desired overbite. These models show the case before and after treatment. Notice that the constant hammering of the mandibular anterior teeth against the gingival border of the maxillary incisors has produced a further protrusion of the teeth, especially the central incisors.

Fig. 5 shows the left side and Fig. 6 the right side, before and after treatment.



Figs. 4-7.

Fig. 7 shows the appliances used in treatment of this type of case. We used a maxillary labial appliance with stops soldered mesial to the buccal tubes and a mandibular depressing appliance and intermaxillary elastics.

The depressor consists of a mandibular lingual appliance with extensions of 0.030 wire soldered to the lingual arch resting on the incisor edge of the mandibular incisors, adjustment being made either by adjusting the extensions over the incisor edge of the teeth or by adjusting the main arch slightly. These adjustments should be infrequent and slight; a scarcely perceptible amount is desired. They should not be made oftener than every three or four months.

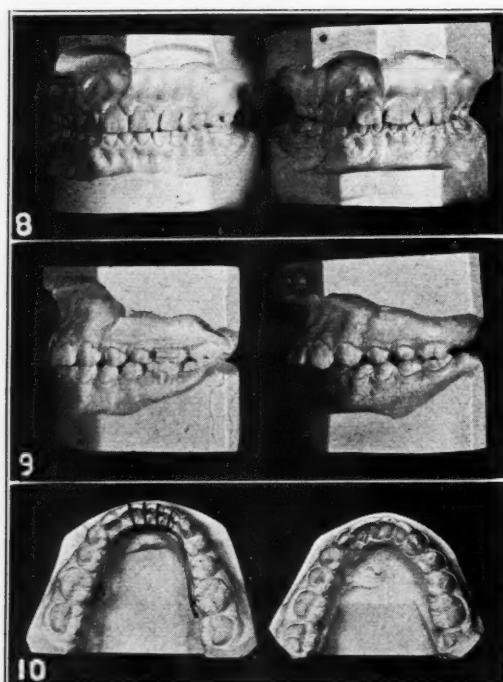
Fig. 8 shows a similar case treated in a similar manner, again showing the

extreme protrusion of the maxillary anterior teeth due to the hammering of the mandibular teeth against the gingival border of the maxillary incisors.

Fig. 9 shows side views of the case.

Fig. 10 shows the depressor in place and the mandibular arch after the teeth have been depressed.

Fig. 11 shows the models of these two closed-bite cases, treated in this manner, before and after the teeth had been depressed. This clearly shows the modification of the curve after the teeth are in their correct positions. We find that



Figs. 8-10.



Fig. 11.

the later in life the teeth are depressed, the more permanent is the result. These cases are shown one and two years after all appliances had been removed.

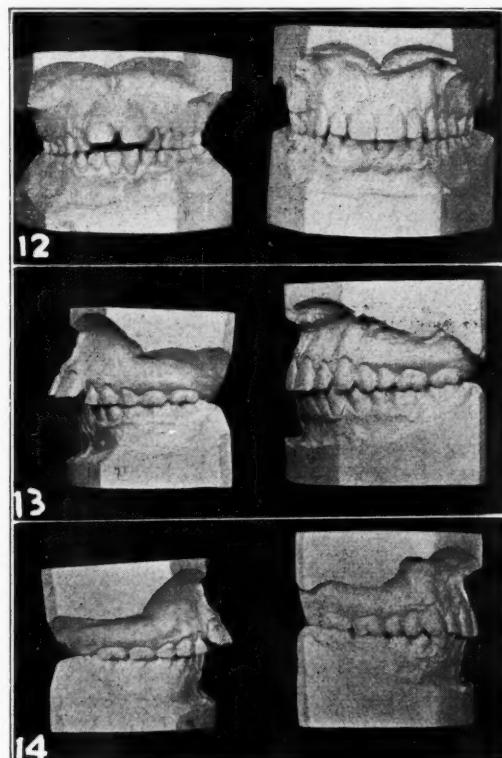
In cases in which we have a definite tendency for the bite to open during treatment, and fortunately these cases are rare, we must proceed with unusual care. We are nearly always able to have a normal overbite relationship for such cases without definitely treating this condition, provided the condition is not the result of some habit. In this type of case we prefer to use the intermaxillary hooks a little longer than usual. If this bite definitely opens, it must be treated at a later period.

Fig. 12 shows a typical distoclusion case with a tendency toward open-bite, and protruding maxillary incisors. These models show the anterior view of the

case at the beginning of treatment and four years after all appliances have been removed.

Fig. 13 shows the left side and Fig. 14 the right side, before and after treatment.

In reference to the type of case in which there is a tendency for the bite to open during treatment, it is our observation that if these cases are carefully treated, with frequent periods of rest, these bites again close to the relative position they were in prior to treatment.



Figs. 12-14.

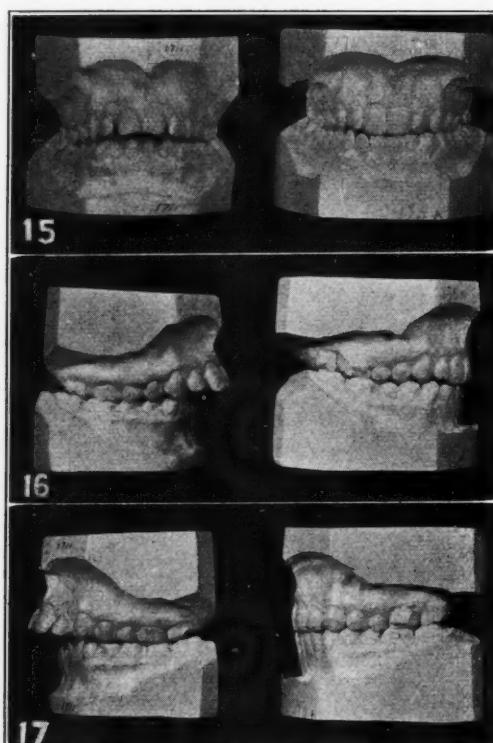
The intermaxillary elastics are worn constantly until the mesiodistal relationship is corrected and then only at night. We always overtreat the mesiodistal relationship.

After the intermaxillary elastics have been worn for a considerable period and a correct or nearly correct relationship of the molars has been established, we have a so-called rest period and remove the appliances and allow the case to adjust to its new position. We find that when we do this, although we may have a slight return toward the former position of the teeth, when we resume treatment, we have virtually a new case to diagnose and treat, and it responds more rapidly and more easily as a result of the readaptation of tissue, and the progress is faster than it would have been had we kept on with the appliances. By dividing the treatment into stages with a rest period after each stage of treatment, we do not have collapse or the need for using retainers after the case is completed.

This type of case, we believe, should be treated, irrespective of age, as soon as we definitely find the lower lip resting on the lingual surfaces of the maxillary

anterior teeth; and one can definitely determine that there is a true distoclusion, for this constant muscular action is a constant force producing a further protrusion of the maxillary anterior teeth. Also, from a health standpoint, this type of case should be treated because with this condition it is impossible for the child to breathe properly through the nose, irrespective of the nasal condition, until the teeth are in such a position as to allow the proper relation of the lips.

We must always keep in mind that when we have a developing case of mal-occlusion, due to a general maldevelopment, the sooner this deformity is recognized and, by treatment, kept in the lines of normal development, the sooner we are aiding the child's development from a general health standpoint. We must not lose sight of the fact that we cannot consider the case completed and our re-



Figs. 15-17.

sponsibility discharged until the complete maturity of the child, usually around the sixteenth to eighteenth years.

Contrary to past teachings and practice, we find we are treating many cases of this type in the adult period of life, and furthermore, that these adult cases are the ones which respond readily to treatment with practically no collapse afterward. The time involved in the treatment of these adult cases is no longer than that in younger ones.

Fig. 15 shows a case in the first division, according to my outline; a true distoclusion of the mandibular arch with protruding maxillary teeth with a tendency toward opening of the bite, in an adult patient, twenty-eight years of age. Fig. 15 is the anterior view before treatment and four years after the beginning of treatment. This patient has worn appliances for about two years of

the four years that she has been under our care. The plan of treatment in this case has been to treat for four to six months and then to leave the appliances off for four to eight months; that is, an interval of rest after an interval of treatment. We have had practically no collapse in this case at the taking off of the appliances during any of the rest periods.

Fig. 16 shows the left side and Fig. 17 the right side of this case with bands but no arches on for the past six months. I am showing this to illustrate an exaggerated case in an adult and the case staying without retention. The appliances used in this case were maxillary labial and mandibular lingual appliances with intermaxillary elastics.

Before leaving this type of distocclusion, I wish to repeat the divisions into which I feel the cases should be grouped for treatment.

1. Cases in which the mandibular molar is in distal relationship to the maxillary first molar, and the maxillary teeth protrude.

(A) Cases in which there is a correct curve in the mandibular arch or in which the supraclusion of the mandibular anterior teeth is such that upon treatment of the mandibular arch a correct overbite will result.

(B) Cases in which the mandibular anterior teeth are in supraclusion, producing a closed-bite of the sort which must be definitely treated.

(C) Cases in which there is a tendency toward opening of the bite.

Let us now consider the second division of cases, in which the mandibular molars are in distal relationship to the maxillary molars with bunched or retruding maxillary incisor teeth.

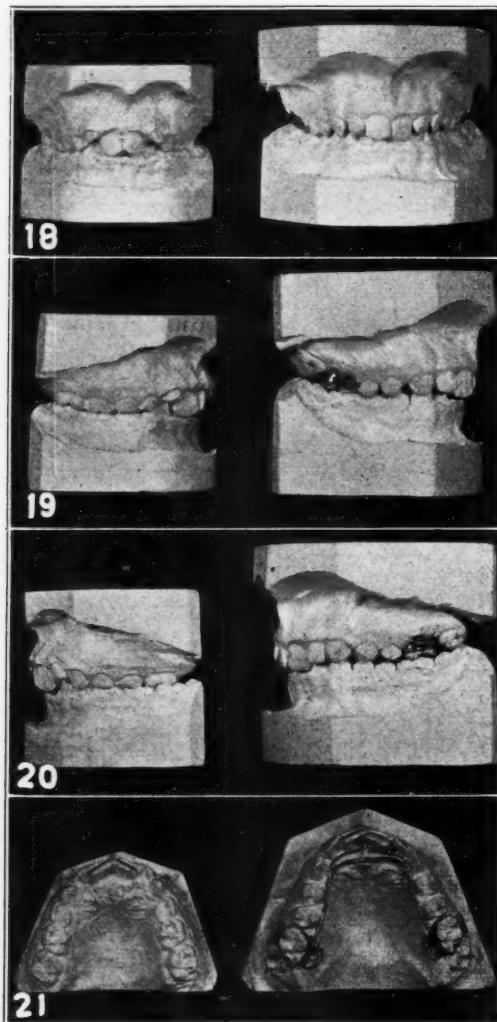
This type of case is that in which there is a definite underdevelopment of the mandible and the maxillary incisors are retruded lingually to such an extent that it is impossible for the mandible to develop forward with the maxillary incisors in this position. The maxillary incisors are sometimes lapped and in some cases the laterals are in their relatively correct positions and the centrals are tipped lingually. The positions the maxillary incisors assume may vary, but they are always retruded, locking the mandible and preventing its forward growth. In this type the apices of the anterior teeth are usually almost in their correct positions and the crowns are tipped lingually.

The first step in the treatment of these cases is to produce the anterior movement of the maxillary incisors to the correct position in the arch. This is done by placing a maxillary lingual arch on the case as our first appliance. The mandibular incisors in this type of case are biting into the gingival tissue at the lingual side of the maxillary incisors, and if the usual type of lingual arch were placed on the case, the mandibular anterior teeth would strike the maxillary lingual arch; so, of necessity, the maxillary lingual must be fitted back of the occluding mandibular anterior teeth. This is the so-called cut-back arch.

The next procedure is to solder two springs of 0.020 wire on each side, coming forward and resting at the gingival border of the incisors to produce the desired mesial movement. At the beginning of this treatment the mandibular teeth in mastication may by biting on these springs drive them slightly into the soft tissues, but when they are relaxed this does not occur. As soon as the maxillary incisors start to move, the springs are cleared and no further difficulty is experienced.

Since maxillary incisors are being brought anteriorly into their correct positions in a large percentage of the cases, as this interference is removed, the mandibular arch comes forward into its correct mesiodistal relationship. After the incisors are corrected, we always institute a rest period if the mandible has not come forward, to allow it to do so.

If, after the rest period of from four to six months, the mandibular arch is still in distal relationship, we proceed with the next step in treatment.

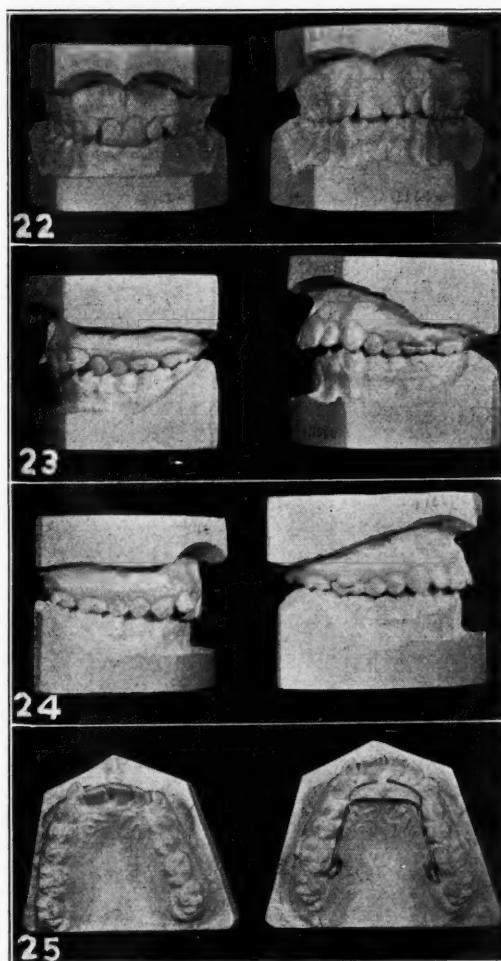


Figs. 18-21.

With the maxillary arch developed to or nearly to its completed arch form, we then have a case of the first division that I described, or a true Class II, Division 1. We treat this with a maxillary labial appliance fitting at the gingival third of the anterior teeth, with stops soldered at the mesial end of the buccal tubes. A close-fitting, mandibular lingual appliance is fitted and the mandibular arch is brought forward with the intermaxillary elastics. This type of case, because of the position of the maxillary anterior teeth, frequently has the appearance of a closed-bite case, but after the interference is removed and the mandible

has developed forward, it is not. Some bites, however, do have to be opened. I shall consider that later.

Fig. 18 shows the anterior view of a case in which there is a distal relationship of the mandibular first molar to the maxillary first molar with retruding maxillary incisors. These models show the case at the beginning of treatment and after the maxillary incisors have been brought forward, which is the first step in the treatment of this case.



Figs. 22-25.

Fig. 19 shows the right side. You will notice that after the maxillary incisor teeth have been brought forward to their correct position in the arch, because this interference was removed, the mandible has developed forward into the correct mesiodistal relationship.

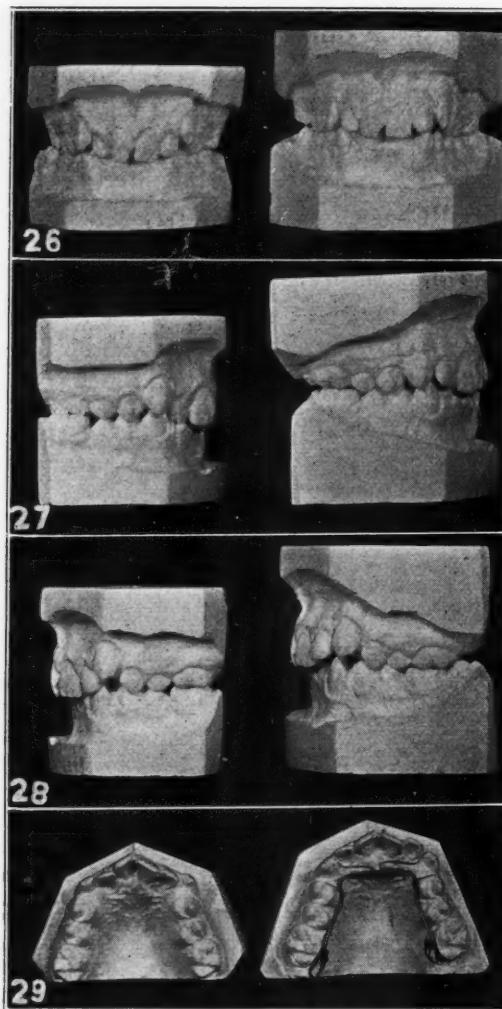
Fig. 20 of the left side shows that we have established the correct mesiodistal relationship on that side.

Fig. 21 shows the occlusal view of the maxillary teeth with the appliance in place, maxillary lingual cut-back across the palate so that it will not be driven into the soft tissue by the occluding mandibular anterior teeth. The auxiliary springs of 0.020 wire are soldered on the occlusal side of the arch.

Fig. 22 shows the anterior view of a case similar to that shown in Figs. 18-21. The illustration shows the first step in treatment, the bringing forward of the maxillary anterior teeth.

Fig. 23 shows the left side and Fig. 24 the right side before and after the maxillary anterior teeth have been brought forward.

Notice that in this case the mandible did not develop sufficiently forward after the interference of the maxillary teeth had been removed. This necessi-



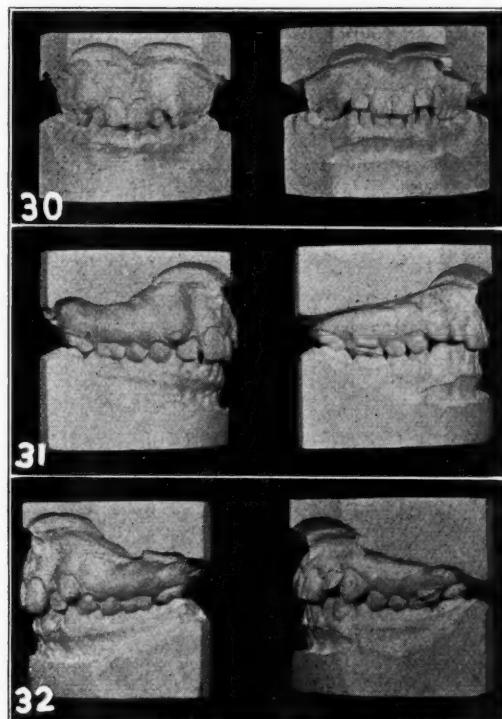
Figs. 26-29.

tated, after the rest period, the second step in the treatment of this case and the use of labial appliance and a mandibular lingual appliance. The treatment in the second step of this case is identical with that described under my first division of cases.

Fig. 25 shows the appliances used in the first step of treatment of this case; a maxillary lingual appliance with auxiliary springs to bring the retruding, maxillary incisor teeth forward.

This case illustrates very clearly the necessity of dividing the treatment of a case into steps, for in this case we have an entirely different case to treat in our second step from that which we had in the preceding case in which the mandibular arch developed into its correct position.

Fig. 26 shows a borderline case between Class I and Class II, after Angle. I am showing this case more to illustrate a type which, if neglected, would at a later stage in development have been a true distal type but, with the proper



Figs. 30-32.

treatment at this time, there is a correct mesiodistal relationship. This anterior view shows the case before and after the maxillary incisors had been brought forward.

Fig. 27 shows the right side, showing how, after the maxillary anterior teeth had been brought forward, the mandibular arch has assumed the correct mesiodistal relationship.

Fig. 28 shows the left side before and after treatment, showing the correct mesiodistal relationship on this side.

Fig. 29 shows the occlusal view with the appliance used. You will notice a slight difference in the type of springs used in this case and the previous one. Due to the lack of space for the canine teeth, we used the recurved, kicker type of spring for the anterior teeth with the stop, auxiliary springs on the first premolars.

Fig. 30 shows the anterior view of another case of the same type as the preceding two. This shows the case at the beginning of treatment and after the anterior teeth have been brought forward to their correct position in the arch.

Fig. 31 shows the right side, illustrating the amount of forward drift in the mandibular arch on this side.

Fig. 32 shows the left side.

The only appliance used in this case was a maxillary lingual appliance with auxiliary springs to bring the maxillary anterior teeth forward.

I shall now discuss the third division, according to my outline. The type is that in which the mandibular first molar is considered distal in its relationship to the maxillary first molar, but where the diagnosis tells us that the maxillary molars are in mesial relation to the face and cranium rather than the mandibular molars in distoelusion.

This condition is probably the most difficult to diagnose and treat of all the so-called distoelusion cases and probably the type that most generally discredits the work of the orthodontist, because of the fact that in this type of case, through the rounding out of the maxillary anterior teeth in an attempt to bring the mandibular arch further forward (the usual treatment) a so-called "orthodontic mouth" is the result. In this condition there is a disharmony in the positions of the maxillary teeth to the face and to the skull; although the teeth may be in reasonably correct relationship to each other. We have a facial deformity far more disfiguring than the original condition.

Determining this type is difficult and requires considerable experience and study to detect it, and then we are not always sure whether we are following the correct prognosis in the treatment. After the treatment of many of these cases, there are certain landmarks which stand out and materially assist us in the diagnosis of the case. In this type we usually have a well-developed mandible with a good facial profile line. The maxilla is almost always in the correct facial line, but there is always a crowding and lapping in the maxillary anterior teeth. This may take the form of prominent canines with the lateral incisors in contact with the first premolars. Sometimes the canines are lingual, and sometimes in younger patients they are unerupted. At times it takes the form of a crowding with multiple rotations in the maxillary arch, and often the maxillary second premolars are in lingual occlusion or are impacted.

The treatment of this type of case is first to place a close-fitting, lingual arch on the mandibular teeth fitting accurately and resting about the center of the mandibular anterior teeth in accurate contact with all of the teeth. A labial appliance with intermaxillary elastics is used on the maxillary teeth. After the maxillary appliance is fitted to the usual position, it is pulled out of the tubes and a stop is soldered mesial to the buccal tubes so that the maxillary labial appliance is not in contact with any of the teeth anterior to the first molar, so that the entire force of the intermaxillary elastics is upon the maxillary first molar, driving it distally. It is advisable in this type of case to use long hooks for the intermaxillary elastics. Care must be taken to keep the maxillary labial appliance at all times from coming in contact with the maxillary anterior teeth, because this would defeat the object of treatment; and so, at subsequent visits, additional stops must be soldered to keep the appliance clear of the incisors and the force of the intermaxillary elastics only on the maxillary molars. It is necessary to drive the maxillary molars back farther than you wish them to be because in the next step in treatment there will be a slight mesial movement of the molars; this must be overdone in this first stage of treatment. Sometimes the molars

move back bodily, sometimes they tip slightly and sometimes badly. This is taken up in the next step.

After the maxillary molars are driven back to their correct position and even farther than we wish them to be in the completed case, the next step is to place a tight-fitting maxillary lingual appliance. Care must be taken in the fitting of this appliance, as it must be in close contact with all the maxillary anterior teeth and must rest firmly so that it may hold the molars in the position into which they have been retruded.

At this stage in treatment, if the molars are tipped, they are straightened with the lingual appliance. This is done by adjusting the appliance to correct this tipping and then pressing it up into place and ligating it to the premolars. After the molars are correct, we allow the lingual appliance to remain in the mouth for a number of months without adjusting it, and a large part of the distal drift of the premolars and canines takes place in this rest period.

The picture at the beginning of the second step in the treatment of this type, is as follows. The mesiodistal relationship is correct. There are spaces between the maxillary molars and the second premolars, providing this readjustment has not taken place during the rest period. In some of these cases the second premolars have followed, to some extent, the distal movement of the maxillary molars, and there is spacing between the maxillary second premolars and also sometimes a little spacing between the canines and premolars.

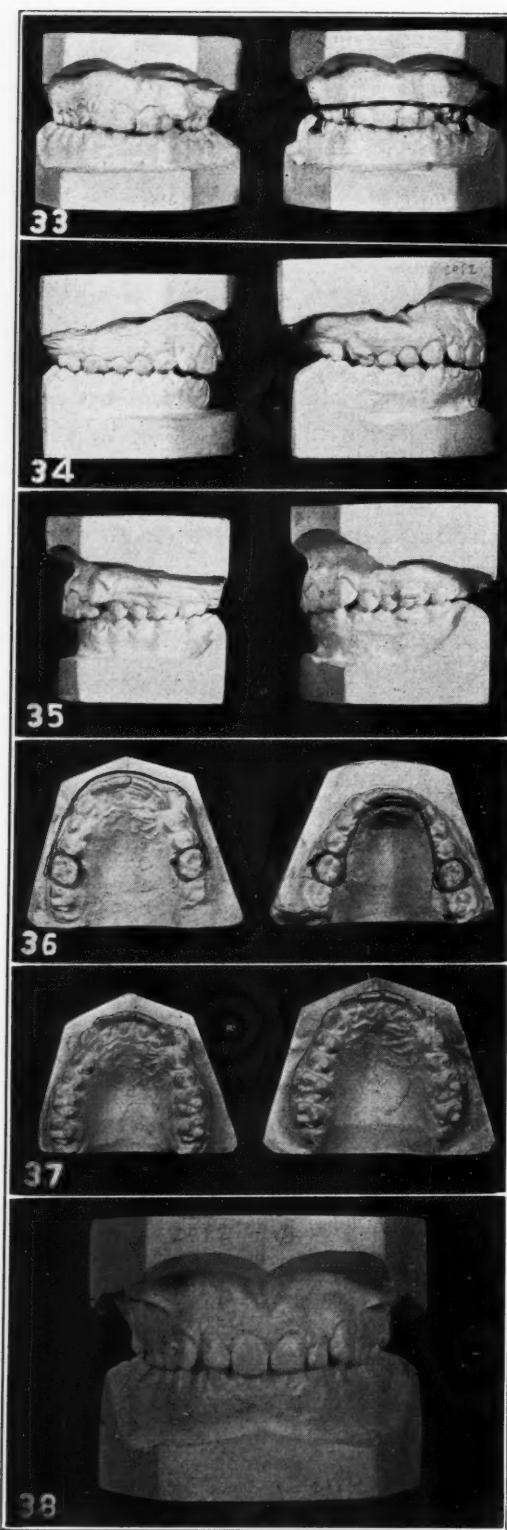
The treatment is then to place auxiliary springs on the maxillary lingual appliance in order to close the spaces, first by bringing the maxillary second premolar into contact with the maxillary first molar and then the first premolar into contact with the maxillary second premolar, and then to retrude the canine if it has not followed of its own accord. This will give us sufficient spacing to correct all the irregularities of the anterior teeth without affecting the normal facial contour of the profile, such as lapping of centrals or laterals over centrals. This procedure is not nearly so difficult as the description would indicate.

Fig. 33 is the anterior view of a case which illustrates the impossibility of trying to diagnose from models. This is the type of case which I have just described which is not a distocclusion case but one in which the maxillary molars and premolars have drifted forward. It is very evident in the facial profile of the patient. This illustration shows the case at the beginning of treatment, showing the prominent canine on the left side and the maxillary labial appliance in place.

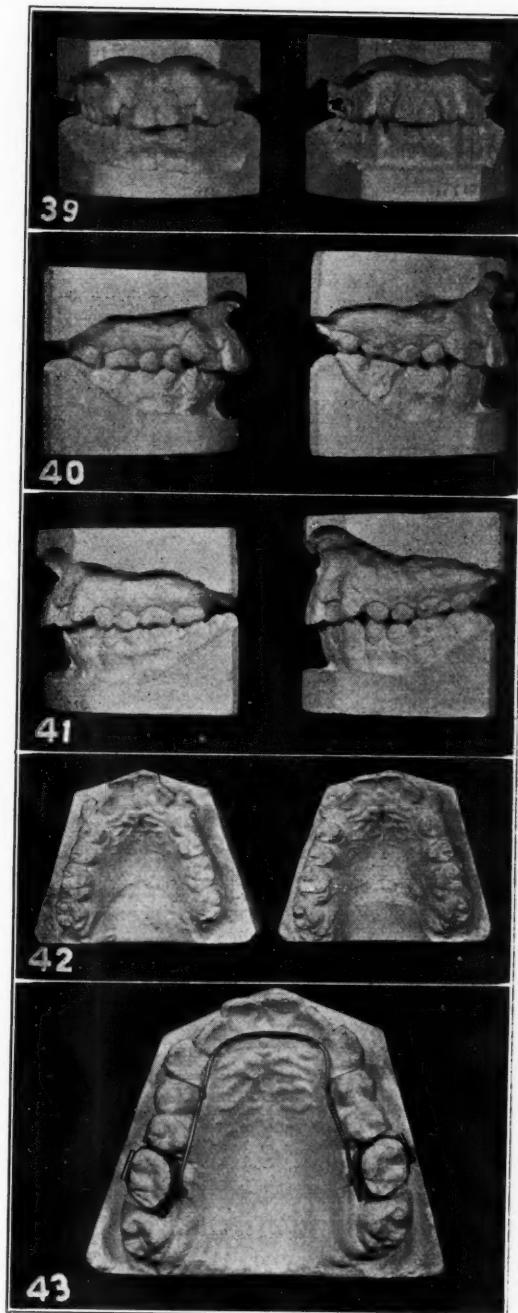
Fig. 34 shows the right side of the case at the beginning of treatment and after the maxillary molar had been driven back into the correct position.

Fig. 35 shows the left side, showing the prominent canine. I think that in this illustration you can see the exaggerated profile line you would have if these maxillary anterior teeth were brought forward. This also shows the position of the molar after it has been retruded into its correct mesiodistal relationship.

Fig. 36 shows the appliances used in treating this case, a close-fitting mandibular lingual appliance in close contact with the anterior teeth and a maxillary labial appliance, fitting, and then pulled out and stops soldered so that all the force of the intermaxillary elastics is on the maxillary first molars. As the molars move distally, allowing the maxillary labial appliance again to come in contact with the maxillary anterior teeth, it must again be pulled out and addi-



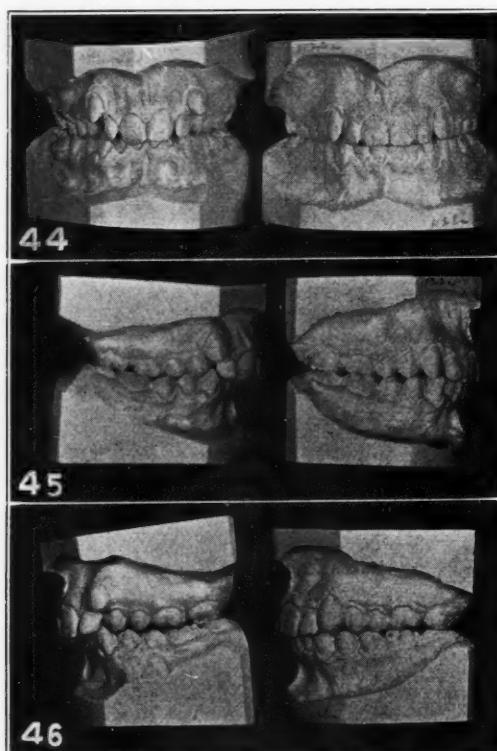
Figs. 33-38.



Figs. 39-43.

tional stops soldered so as to continue to keep all the force on the maxillary molars.

Fig. 37 shows the case from the occlusal view before and after the molars have been driven back into their correct mesiodistal positions. Notice that the molar on the right side has been rather badly tipped and the one on the left is somewhat tipped. At this stage we place a maxillary lingual appliance in the mouth and adjust it to correct this tipping and to straighten the molars and then ligate it to the premolars. This tipping is always easily corrected. Note that the spacing between the first molars and the second premolars and between the first and second premolars has occurred as a result of the molars being pushed back; the premolars have followed and a space has also opened for the canine. After



Figs. 44-46.

a sufficient rest period, auxiliary springs are soldered on the maxillary lingual appliance in order to bring the premolars back and to make space for the canine and to take care of the slight lapping of the anterior teeth.

Fig. 38 shows the anterior view of the case after the molars have been re-truded. Notice the lack of any exaggeration of the positions of the maxillary anterior teeth. The patient has a correct profile line.

Fig. 39 shows the anterior view of a case similar to that shown in Figs. 33-38. This shows even more clearly in the patient than in these models the necessity for not producing any more forward movement of the maxillary anterior teeth. This illustration shows the case at the beginning of treatment and after the first molars have been driven back into their correct mesiodistal relationship.

Fig. 40 shows the right side, and this and the following slide (Fig. 41) illustrate clearly the drifting of the maxillary molars and the necessity for driving them distally. The right side is shown before and after the molar has been retruded.

Fig. 41 shows the left side before and after the molar has been driven distally. A tight-fitting mandibular lingual appliance and a maxillary labial appliance were used. The maxillary appliance, after being correctly fitted, was pulled out and stops were soldered so that the force of the intermaxillary elastics came entirely on the molar teeth.

Fig. 42 shows the occlusal view of the maxillary teeth before and after the molars are retruded. Notice in the models after treatment, the slight tipping of

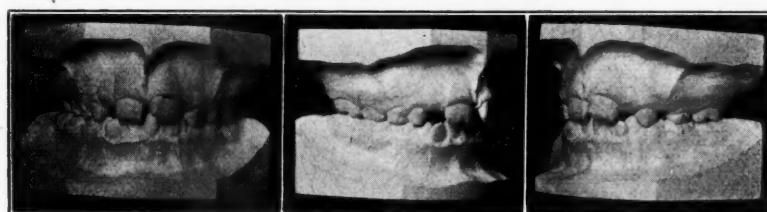


Fig. 47.

Fig. 48.

Fig. 49.



Fig. 50.

the molars and the spacing between the second premolar and molar and also between the first and second premolars and between the canine and first premolar, showing the distal drift of the premolars.

Fig. 43 shows the lingual appliance in place after it has been adjusted to straighten the molars which have been tipped. Auxiliary springs, as shown, are soldered to the lingual appliance to retrude the premolars further and then the anterior lapping can be corrected by additional springs.

Figs. 44, 45, and 46 show a case treated the same as the preceding ones, before treatment and four years after all appliances have been removed.

Fig. 47 is an illustration of a case from the practice of Dr. Hager. It shows the shifting of the maxillary molar in this type of case.

Fig. 48, the right side of this case, shows the correct relationship of the molars for this age.

Fig. 49 shows the left side of this case, with the mandibular molar in distal relationship to the maxillary molar.

Fig. 50 shows the occlusal view of this case. You will remember that on the right side there is a normal molar relationship and on the left side a distal position of the mandibular molar. From the occlusal view it is apparent that

because of the large cavity in the maxillary left second deciduous molar the maxillary first, permanent molar has drifted forward. This apparent distal relationship of the mandibular molar is really a mesial relationship of the maxillary molar, and in treatment the maxillary molar will have to be moved distally.

I shall proceed with the fourth group in my outline, unilateral distoclusion cases.

The treatment of unilateral distoclusion cases must be divided into two exactly opposite types for treatment, and these two types must be recognized and treated in exactly opposite ways.

The first type is that in which the mandibular first molar on one side is distal in its relationship to the maxillary molar. The second type is that in which the case is not a true distoclusion but in which the maxillary molar has drifted forward. There are certain definite well-defined characteristics that aid materially in our diagnosis. In the case in which the mandibular molar on one side is truly distal and the molar must be brought forward, the maxilla is usually well developed, rather symmetrical, and the median line is usually correct.

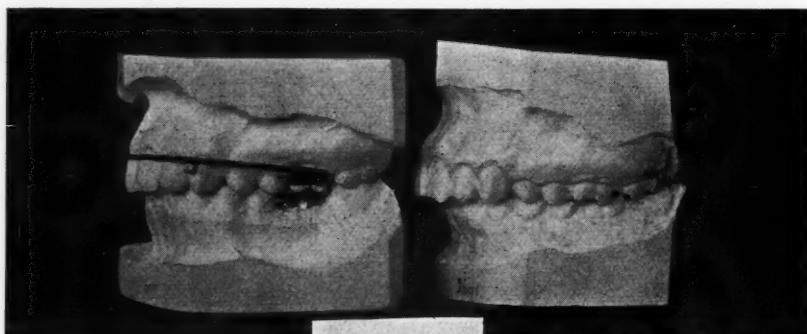


Fig. 51.

There may be irregularities in the teeth themselves, but the arch as a whole is usually rather well developed. The anteroposterior relation of the mandibular arch is correct on one side and the median line is usually distal toward the side on which there is the distoclusion, and there is usually a rather prominent overbite. Usually in this type of case the mandible is rather well developed.

In treatment we usually place a labial appliance on the maxillary arch in close contact with the anterior teeth, with stops soldered on the wire at the mesial end of the tube and a lower band with a hook for the intermaxillary elastics, which pull the distal molar forward, disregarding all other teeth. This occasionally leads to a crowding of the premolars and sometimes of the canines, but this is easily corrected after the molar relationship is corrected. After a rest period is maintained, we can easily correct the irregularities anterior to the molar and frequently they correct themselves. In this treatment we sometimes get a minor rotation of the molar, but not so much as would be expected. After the molar relationship is corrected, for adaptation under the new conditions, we place a mandibular lingual arch on the mandibular arch to round out and correct the arch form.

Fig. 51 shows the left side of the original and of the corrected models. The

one *without* appliances is the original and shows the mandibular molar in distoclusion. The one *with* appliances shows the mesiodistal relation corrected, with appliances which were used in place, all except the intermaxillary elastic bands.

Fig. 52 shows the right side of the original, and the second model with mesiodistal relationship normal.

Fig. 53 shows the occlusal view of the case before and after the mesiodistal relationship has been corrected. The appliances are in place, showing the max-

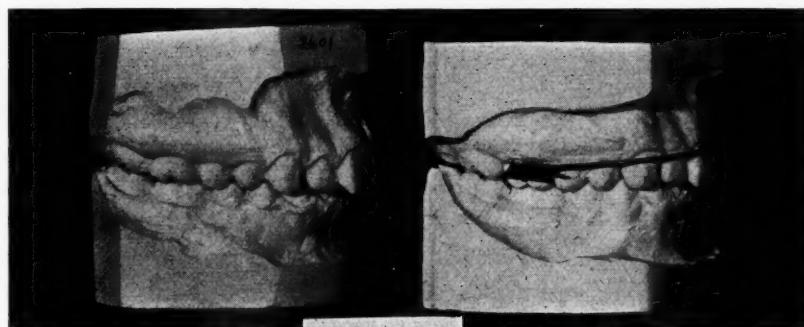


Fig. 52.

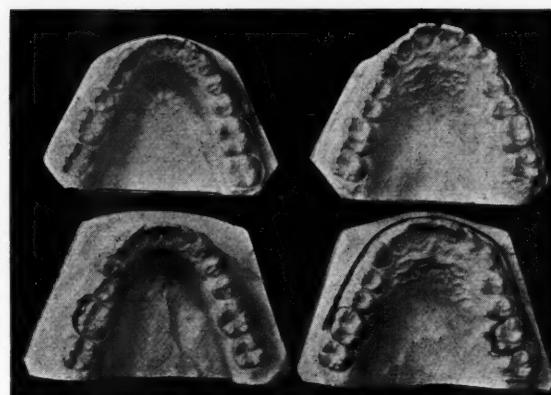


Fig. 53.



Fig. 54.

illary labial arch in contact with the maxillary anterior teeth, with stops soldered so that they rest against the buccal tubes. You will notice a slight crowding in the canine region of the mandibular left side. There is a band on the first molar on the side which was distal, but there is no lingual appliance. This affords the greatest possible latitude in movement and tissue adjustment. After this molar has been brought forward, for the next stage in treatment, a mandibular lingual appliance is used to correct the crowding produced by bringing the molar forward.

Fig. 54 shows an enlarged view of the hook on the mandibular molar band. Where no mandibular lingual appliance is used, we like to have the hook soldered so that the pull comes on the mesiobuccal cusp of the mandibular molar. This, we think, prevents a large amount of rotation.

I shall now take up the fifth group in my outline, the type in which the maxillary molar is mesial in its relationship to the mandibular molar on one side. This type of case is a mesioelusion of the maxillary arch and not a distal position of the mandibular arch, but it is usually classified as a distoelusion. This type of so-called unilateral distoelusion presents the following landmarks. The mandibular arch is usually well rounded and well developed, and the median line is usually correct with the face. The maxillary teeth *always* show a drift of the median line away from the side of the distal relationship. This takes the form of two conditions, the lingual position of the lateral incisor or the lingual or labial position of the canine. There is always a bunching on the side on which the canine is out of line.

To treat this, we place a maxillary labial appliance on the maxillary arch, adjusted to fit correctly; and a close tight-fitting mandibular lingual appliance

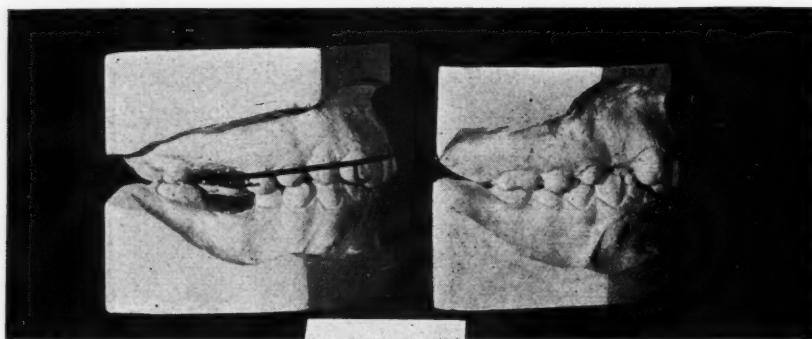


Fig. 55.

in accurate close contact with all the mandibular anterior teeth. We place an intermaxillary hook on the side in which the maxillary molar is mesial. We solder stops so that the entire force of the intermaxillary rubber is exerted on the molar. The labial arch is pulled out of the tube so that the arch is not in contact with the maxillary anterior teeth. From time to time, as the maxillary molar moves distally, the appliance comes in contact with the maxillary anterior teeth. At such times, it will again have to be pulled out and another stop soldered, to keep it away from the maxillary, anterior teeth. In this manner the maxillary molar is driven back to its correct position.

After the mesiodistal relationship is corrected, for the second step in treatment, we place a close-fitting maxillary lingual appliance and institute a rest period of several months. By the passive position of the arch on the case, we have a great deal of readjustment of the teeth anterior to the molars, and many desirable adaptations occur. If after the rest period the premolars and canines have not readjusted themselves, we solder auxiliary springs to the lingual appliance to bring back the premolars, then the canine and then the central incisors, and later we balance the median line with the mandible and the face.

Fig. 55 shows the right side of a case of this type before and after the maxillary first molar has been driven distally. This case shows that the maxillary molar has drifted mesially and forced the maxillary canine to erupt lingually. The appliances are in place with the exception of the intermaxillary elastics.

Fig. 56 shows the normal relationship of the molars on the left side.

Fig. 57 shows the occlusal view at the beginning of and after treatment. Notice the close-fitting mandibular lingual appliance for stability. After the maxillary molar is driven back to its correct mesiodistal relationship, there is a

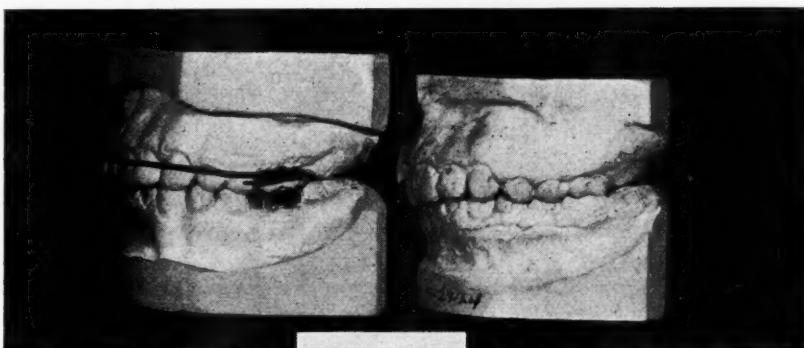


Fig. 56.

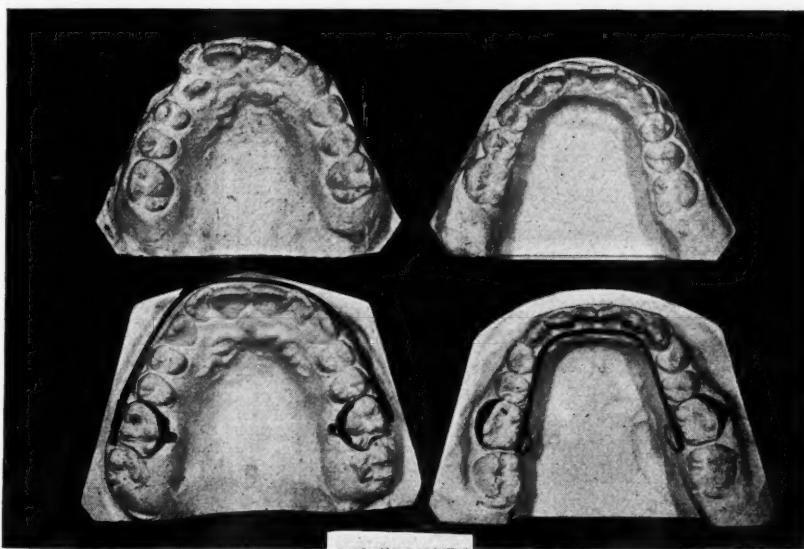


Fig. 57.

space between the maxillary second premolar and the maxillary first molar and sometimes between the maxillary first and second premolars. At this stage in treatment, a close-fitting, maxillary lingual appliance is placed on the maxillary arch. The canine, in this case, was moved into its position with an auxiliary spring during this step in treatment.

Fig. 58 shows the method of adjusting the maxillary labial appliance in order to drive the maxillary molar distally. A shows the arch adjusted to its original position, and B shows the method of pulling the arch out of the tube

with stop soldered to hold the arch so as to have the entire pull of the intermaxillary elastic on the molar tooth. As this maxillary molar moves distally, the arch must again be pulled out and additional stops soldered.

A word of explanation regarding rest periods is indicated. There are limits to the extent of tissue tolerance; so after any extensive movement we allow a passive position of the appliances at first, and later we remove the appliances completely to allow the readjusting of tissues to the new position of the teeth. By this readjustment we shall have an entirely normal tissue relationship upon which to resume treatment, and the case will proceed as though it were a new case.

No paper on distoclusion would be complete without a discussion of the closed-bite case, although there is material in that alone for several papers, yet I feel that we must consider it, briefly, in this presentation, as it relates to these cases of distoclusion.

Where there is a disharmony in the length of the incisor teeth in relation to the premolars and molars, giving an exaggerated curve, it is necessary to cor-

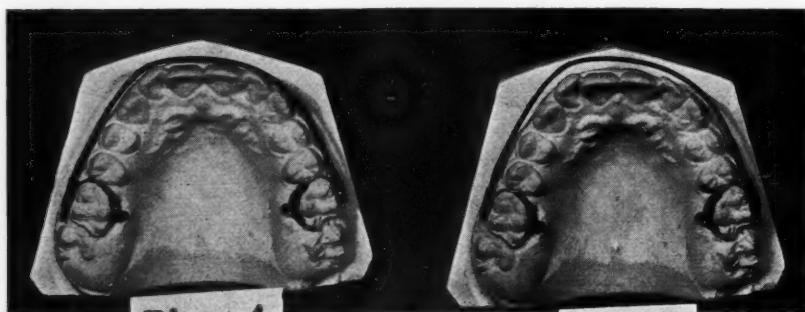


Fig. 58.

rect this condition by producing either an elongation of the molars or a depression of the anterior teeth.

We believe that the determining factor in the length of the bite is the muscles which hold the mandible in relation with the maxillary arch. Anatomically, the mandible moves as a hinge, and the muscles of mastication with their accessory muscles are responsible for the occluding of the teeth. We believe that this muscular length is the prime factor in determining the length of the bite and, in consequence, the length of the erupted teeth. This is proved, clinically, by the fact which we have all observed that muscles cannot be lengthened, except as they are developing. When we have built up teeth to open the bite, after a time these teeth revert to their original position; that is, the teeth we have built up are depressed in the sockets so that the bite is in its original position. While we all know that if a tooth is lost, the opposing tooth will erupt into the space, we have never been able to keep the bite open permanently by building up the molars in excess of the muscular length; so we do not believe that the molars can be permanently elongated. What we believe is that the correction of this condition resolves itself entirely on the depression of the anterior teeth which do not definitely occlude with an antagonist and so are not directly affected by this muscular length.

We find a large percentage of so-called closed-bite cases in the deciduous and mixed dentures and a correspondingly small percentage of closed-bites in the permanent dentition. Hence we do not treat, nor do we think that these cases can be permanently treated, until all the permanent teeth, including the premolars and the second molars, are fully erupted, for by delaying until this time the number that can or should be treated is reduced.

Hellman tells us that the developing ramus continues to develop until the sixteenth or eighteenth year. So how can we determine the length of the bite until well along in or after the developmental period? By delaying until this period, there are comparatively few bites that we have to open. We use the so-called "depressor" for this; 0.030 wire soldered to the lingual arch, resting on the incisor edge of the mandibular anterior teeth and, by adjusting either the extensions or the arch, itself, bring a slight pressure on the incisor edge of the mandibular incisors and so depress them into their sockets. This must be done carefully. At times we do the same thing on the maxillary teeth by a similar extension on a labial arch.

There is one type of closed-bite case which usually belongs to Class I cases which we have never successfully treated. It is the one in which we do not have an exaggerated curve, in which the teeth are not erupted as fully as usual, and in which, by virtue of the heavy muscles, the bite is heavy and close with a powerful, muscular action. There is usually a sharp, pointed chin and features that we find to be characteristic of this class, with which you are familiar. We have never permanently opened such a bite.

A few words regarding the finishing of cases is in order. The two most important factors in the finishing of cases are: first, the proper rotation and adjustment of the molars, and, second, the proper width and rotations of the canines, for it is impossible to maintain the correct, mesiodistal relationships of the case without the correct occlusion of the molars, as it is impossible to keep the anterior teeth from crowding later on if we do not have proper canine width and rotations.

In presenting this paper I feel as though I were trying to write an orthodontic textbook or present a course in one hour; therefore, of necessity, many details and many variations of cases have been omitted or slighted. All of you will think of special cases and conditions to which this paper has not referred, but it is presented in the hope that a paper entirely on clinical application of treatment may be of help.

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#### DISCUSSIONS

*Dr. Glenn H. Whitson.*—Years ago as a member of a class under Dr. Mershon, I became acquainted with the essayist and during that class I listened to his preachers with keen interest, tinged with a mild skepticism.

The essayist is fundamentally sound in his suggestion for a definite outline of treatment. That is imperative if the orthodontist is to proceed logically step by step through the different phases of treatment until the ultimate goal, the establishment of ideal occlusion, is

reached. However, if the initial diagnosis is correct, why the necessity for the continual and so-called rediagnosis? A written outline of treatment should cover the treatment thoroughly from beginning to end as expressed by Dr. Angle, "It goes without saying that before undertaking treatment of any case there should be always in the mind of the orthodontist a clear conception of the individual line of occlusion. This is only to be gained, first, by a very thorough and complete knowledge of the normal human denture, that is, of its growth, development, form and relationship as a whole and of its units, of its structure, functions and the laws of dynamics on which it operates; second, by the special study of the malocclusion, muscular and other perversions and extent of general and special unbalance of parts and function of the case in hand."

There seems to be considerable misapprehension in the mind of the essayist as to what Angle's Class II really is. Can anything be more beautifully clear than; The mandibular arch distal to normal in its relation to the maxillary arch.

Division 1.—Bilaterally distal, protruding maxillary incisors. Primarily, at least, associated with mouth-breathing.

Subdivision.—Unilaterally distal, protruding maxillary incisors. Primarily, at least, associated with mouth-breathing.

Division 2.—Bilaterally distal, retruding maxillary incisors. Normal breathers.

Subdivision.—Unilaterally distal, retruding maxillary incisors. Normal breathers.

Then why this labored attempt to describe fundamental conditions which were so clearly set forth years ago, probably before either the essayist or your humble discussor had even cut a tooth?

There are also other landmarks which must be used in conjunction with the molar relation. It must also be borne in mind that neither Dr. Angle nor his more recent students make a diagnosis resting entirely upon the position of the first molar. For a paper which was supposed to discuss the treatment of Class II cases, I fear that the essayist has spent much of his time in the description and treatment of what appears to me as Class I. The description which the essayist gives of those cases in which the maxillary molars and premolars are in mesial relation to the mandibulars are quickly and easily recognized as Class I and when treated as such are much more simple than if undertaken from the Class II point of view.

The rest period idea is excellent. But why abandon a case in the midst of treatment? An efficient appliance should surely be capable of correcting the malrelation of more than two teeth at a time. Has the essayist never heard of the mass-movement of teeth? Why not in these Class II cases carry the buccal teeth distally simultaneously? It can be done. Then in the Class II, Division 1 case, why not carry the buccal teeth distally simultaneously and at the same time making the necessary depressions, or in the Class II Division 2 case carry the buccal teeth distally en masse, relieving pressure upon the anteriors by means of the stops which he advocates, and open a space for the canines, which are locked out of the line of occlusion. Then after the placing of a suitable retainer, the elimination of the injurious habits and the establishment of a regime of muscle training, give the patient the necessary rest period. In the treatment of Class II, Division 2 cases the essayist admits that he is forced to use a cut-back lingual arch on the maxillary teeth because of the occlusal force of the mandibular anteriors, but still advocates the use of 0.020 spring attached to this arch. If the arch cannot be fitted, how can the springs be efficient? For they must of necessity lie in the direct path of the occluding mandibular anteriors. Eventually the teeth are maneuvered from a Class II, Division 2 into a Class II, Division 1 and treated as a true Class II, Division 1, to quote the essayist. Which reminds me of the story of the old country doctor who always tried to manipulate his patients into a high fever, and when pressed for an explanation, said, "Well you know I'm a marvel at curing fevers."

The third division according to the essayist's outline, that in which the maxillary first molar and premolars seem to be mesial to normal, and upon closer examination, the supposition proves to be correct, can be quite easily carried distally en masse, without the problematic self-correction, during another rest period. These teeth may be at an incorrect axial inclination and if uprighted into their correct axial position will be found to be in their proper occlusal relation with the mandibular teeth. It is not such a terribly complicated situation if diagnosed and treated properly.

The unilateral cases, or subdivisions of the first and second divisions of Class II, present no marked or radical departure in treatment from that outlined above.

The essayist's fifth group, the unilateral mesial position of the maxillary molar, may doubtless be corrected in the manner described, i. e., the offending molar carried distally, followed by a six months' rest period, and the slow and dilatory tooth by tooth, corrective movement resumed.

The picture which the essayist draws of the closed-bite cases is very gloomy indeed. May I suggest that instead of simply elongating the molars and forcing those teeth to bear the entire force of mastication that he try the expedient of bringing all the teeth to the line of occlusion, thus equally distributing that force upon the teeth, which, when placed in their correct axial position, can sustain the masticatory burden for which they were intended.

Speaking of the lingual arch mechanism, Dr. Allan G. Brody says, "Analyzing the mechanism from the only three angles that are of importance, i. e., physiology, mechanics and art, it might be well to apply these same tests . . . for the sake of comparison.

"Physiology. I do believe a tooth should be moved gently but continuously in one direction. Back-play or jiggling should be eliminated just as far as is humanly possible. Bone changes are going on around a moving tooth in much the same manner as they are in the case of a fracture. Spicules are reverting to osteoid tissue, changing their directions and, when the tooth comes to rest, arranging themselves to stand the stresses in their new position, and ossifying. It is a fact of common knowledge that 'splinting' or some form of firm support is necessary if we hope for a rapid regeneration of bone. For this reason I believe all teeth that must stand masticating force during orthodontic treatment should be given the fullest amount of support available. This implies a stiff arch and a definite attachment of that arch to the tooth through a bracket.

"For that reason I hold the finger spring as absolutely unphysiologic in orthodontic treatment. We must remember that immediately after we bring force, of even the gentlest nature against a tooth, there is an increased blood supply to the socket with a consequent elevation of the tooth. This in turn leads to a greater masticating stress and we are on the verge of traumatic occlusion. The lingual arch, through its finger springs, lends no support to the tooth to help to take care of the additional load. . . . Furthermore, the presence of any mechanism on the lingual surface of the tooth is an invitation to the formation of tongue habits, and the lingual arch is probably the worst offender along these lines.

"Mechanically, this mechanism stands at the bottom of the list, . . . it is lamentably weak in molar attachments to the teeth. Like nearly all the other appliances, all of the force expended through the arch comes eventually to rest with the molars, and this is far from desired. The auxiliary springs will permit of the tipping of a tooth but over even this simple movement it has no positive control. Bodily movement of teeth is next to impossible. Rotations demand the addition of more loops and springs and the depression of anteriors in Class II cases calls for an incisal hook over these teeth. But no matter how many accessories are added, the appliance still shows its primary weakness of stability and lack of individual tooth control.

"In art or appearance the lingual arch leads all others, but this should never be a factor except between appliances of equal physiologic and mechanical efficiency. I have never found children of an orthodontic age very sensitive about an appliance so long as it was comfortable and did not have to be worn for too long a period of time. I would place the ugliest mechanism in the mouth of a child if it were the most efficient and could be gotten rid of in the shortest period of time rather than place the most beautiful and know that it had to remain for five to eight years, which Dr. Mershon claims is the average for the lingual arch."

In conclusion I want again to emphasize these salient facts for your consideration.

1. The necessity for a thorough study of the case at hand, including a comprehensive case analysis, diagnosis and a complete and thorough outline of treatment.
2. The advantages to be derived from a series of rest periods.
3. The very obvious lack of appreciation by the essayist, for any orthodontic mechanism capable of producing the mass movement of teeth.

## DENTAL AND ORTHODONTIC OBSERVATIONS ON 289 ADULT AND 53 IMMATURE SKULLS FROM PECOS, NEW MEXICO\*†

HABIB Y. RIHAN, B.A., D.M.D., BEIRUT, SYRIA

### ADULT SKULLS

**G**ENERAL bony development is characteristic of practically all the skulls. Ninety-eight per cent of the skulls showed good development. This may be attributed to the primitive living habits of these Pecos Indians.

Mandibular lingual surface protrusions (mandibular tori) were observed in 47.4 per cent of mandibles and were absent in 38.7 per cent. The remaining 13.9 per cent have the lingual process evenly thickened. The maxillary median raphe (palatine torus) is present as a slight ridge in 20 per cent of the cases only. It has been explained by some that such protrusions and ridges are the natural response to masticatory stimulation, in an effort to reinforce the bony

TABLE I  
NOTES ON DENTAL DEVELOPMENT IN IMMATURE CRANIA

#### *Age 7 to 8 months*

The permanent central and lateral incisor caps partly formed and calcified.  
Cusps of the first permanent molar calcified.

#### *Age 17 months.* No. 60,187-7, rachitis case.

The alignment of the deciduous teeth is abnormal.  
The development of the alveolar process is characteristically abnormal.

#### *Age 2 years*

The second molar crypts are well defined.  
Arch width is intercanine 25 mm. and inter second molar 30 mm.  
The tympanic plate is still open.  
Anomaly: (No. 60,204) mandibular right central and lateral incisors fused together.

#### *Age 4 to 5 years*

Cusps of the permanent second molars are calcified.  
The tympanic plate is still open.

#### *Age 6 to 7 years*

Deciduous anterior teeth do not show much spacing.  
Their roots are bent or curved labially out of the way of the permanent ones.  
Attrition of deciduous molar cusps is apparent.  
The tympanic plate is still open.

#### *Age 7 to 8 years*

The third molar crypts are present; 2 to 5 mm. in diameter.  
Arch widths vary from 22 mm., 29 mm., 31 mm. (intercanine, inter deciduous second molar, inter permanent first molar) to 29 mm., 35 mm., 37 mm.  
The tympanic plate is closed in some cases.  
Anomalies: (No. 60,726, No. 60,263) deciduous centrals having two root canal branches and canines having three the length of the apical third of the root.

#### *Age 9 to 10 years*

The arch widths are 27 mm., 34 mm., 36 mm.  
The maxillary third molar crypts are 6 to 8 mm. and the mandibular 4 to 5 mm.  
The tympanic plate is generally ossified.

#### *Age 15 to 16 years*

Arch widths are 26 mm., 37 mm., 40 mm. (intercanine, first molar, second molar).

\*A paper presented at the Second International Orthodontic Congress, London, July, 1931.

†These skulls form a part of the skeletal material at the Peabody Museum, Harvard University. This material comes from the ruins of the Indian Pueblo of Pecos, in north central New Mexico, which was inhabited from 800 (or 1200) A. D. to 1800 A. D.

The study was made under the auspices of the Harvard Dental School and with the courtesy and advice of Professor Hooton of the Peabody Museum.

structure in those parts sustaining the stress transmitted by the teeth. My observations have led me to believe that this is probably incorrect. The mandibular protrusions are found mostly lingual to the premolars, which have a limited occlusal surface and consequently bear less stress than the molars, and therefore need no special bony reenforcement. Similarly, the palatine ridge is found usually near the anterior palatine foramen, or it is most prominent there. This fact would indicate that it is not a reenforcement, since it is anterior to the area where reenforcement is needed. Then again these mandibular and palatine growths are absent in a great many cases that show marked attrition, a condition which means necessarily excessive stresses and would call for bony reenforcement. By reference to Table II, one will find marked attrition in 97 per cent of the skulls. In attempting to explain the etiology of these conditions, I should say that the median raphe may be considered as a benign growth, the result of the continued activity on the part of the embryonic osteoblasts that brought about the union of the nasal septum and the palatal processes. The mandibular protrusions may be considered as benign growths also with traumatic masticatory and periodontal irritations as the causative factors. Their unevenness is a further proof of their nonphysiologic nature.

TABLE II  
TABLE OF STATISTICS. ADULTS (289)

Bony development	Arch average widths		
	Normal	Intereanine	26 mm.
		Inter first molar	36 mm.
Overdeveloped	8.3%	Inter second molar	40 mm.
Underdeveloped	2.0%		
Median raphe (Palatine torus)		Tooth form	
Present	20.0%	Square	63.6%
Absent	80.0%	Tapering	22.0%
		Ovoid	14.4%
Mandibular torus		Attrition	
Present	47.4%	Marked attrition	97.2%
Absent	38.7%	Unilateral attrition	0.8%
Evenly thickened	13.9%	No attrition	2.0%
Relation of jaws		Caries	
Normal	99.2%	Present	47.9%
Mesial	0.8%	Absent	52.1%
Articular eminence		Occlusal caries	33.6%
Normal	66.7%	Proximal caries	14.3%
Prominent	1.2%	Loss of teeth	
Reduced	19.3%	No loss	52.5%
Asymmetrical	12.8%	With loss	47.5%
Tympanic plate		Periodontal disease	
Normal	80.0%	Present	13.3%
Perforated (Incomplete)	20.0%	Alveolar abscess	
Relation of arches		Present	26.0%
Normal	67.6%		
Neutroelusion	29.0%		
Distocclusion	0.5%		
Mesiocclusion	2.9%		
Arch form			
Parabolic	66.5%		
Hyperbolic	30.7%		
Elliptical	2.8%		

The percentages were taken of the number of skulls that could be studied and observed as having the characteristic mentioned.

Nasal development was observed to be in harmony with the general development of the face, except that 43.5 per cent of the cases showed deviation of the septum. But in no case were there bony obstructions sufficient to lead to mouth-breathing, and no indications of such a condition are to be found.

The relations of the dental arches are quite interesting. Table II shows that of the 207 skulls where definite observations could be made, 140 or 67.6 per cent are normal and 29 per cent are cases of neutroclusion. No. 59,908 presents unilateral distoclusion. The left side, which is distal, shows more attrition than the right, and the left condyle path has a smaller angle, with a certain amount of bone deposited on the floor of the glenoid fossa. No. 60,007 is a distinct case of mesioclusion with an enlarged mandibular angle, an underdeveloped maxilla, a reduced condylepath angle, and condyles that are flattened externointernally. No. 59,813 shows unilateral mesioclusion of the right side. The right mandibular angle is greater than the left, and the right condyle path angle is smaller than the left. In this case also deposition of bone to raise the floor of the glenoid fossa is noticeable. Evidently unilateral disto and mesioclusions elevate the condyle from the floor of the fossa, and this is compensated for by the deposition of bone.

The form of the dental arch is a wide parabola in 66.5 per cent, a hyperbola in 30.7 per cent, and elliptical in 2.8 per cent. The average width of the arch is:

Intercanine	26 mm.
Inter first molars	36 mm.
Inter second molars	40 mm.

The range of variation in the width is considerable. The minimum width is 23 mm., 33 mm., 37 mm., and the maximum is around 29 mm., 39 mm., 41 mm. It was observed that the majority have a ten millimeter difference between intercanine and inter first molar widths and a 4 mm. difference between inter first and inter second molar widths. But variations ranging from 7 mm. to 13 mm. and from 3 mm. to 5 mm. respectively were observed.

The teeth vary in form between the square (63.6 per cent), ovoid (14.4 per cent), and tapering (22 per cent).

The vault form does not show much variation. Normal development is easily noticeable. The edentulous cases are quite flat, due to the almost total resorption of the alveolar processes. Pyorrhea must have been the usual cause of the loss of teeth.

In about 33 per cent the articular eminence is reduced by resorption with a harmonious resorption of the condyloid head of the mandible. Such resorption and the building up of the glenoid fossa can be understood when observing the extreme condition of attrition in a great many of the cases. In some instances the character of the bony tissue shows that arthritic conditions must have existed as a result of frictional pressure from the condyle.

Deformed skulls having one side of the back pressed forward show a forward position of the glenoid fossa on that side in advance of the other glenoid fossa by about half the difference between the anteroposterior lengths of the two sides of the skull.

The tympanic plate was observed at the suggestion of some orthodontist friends who were under the impression that distoclusion, attrition, or a general infraclusion may cause enough friction by the condyle on the tympanic plate to cause perforation of the latter. These observations have shown me that the perforations were only rudimentary openings, the result of the failure of the tympanic plate to complete its ossification. The study of the immature skulls showed that ossification is usually completed between the ages of eight and ten years. However, I am unable to say what sort of conditions existed in cases of definite distoclusion, as none were found among these skulls.

Marked attrition of the occlusal surfaces of the teeth, already referred to, is found in 97.2 per cent. This general condition indicates the character of the food used by these peoples as well as their powerful muscular development. Although part of the wear may have been due to the fine stony grit that came off their corn grinders, the greater part is due to the rough food (maize, raw and prepared), and the interdental friction, especially after wear had started.

Caries is present in 47.9 per cent and loss of teeth (one or more) is found in 47.6 per cent. Periodontal disease is present in 13.3 per cent. Caries is mostly occlusal and is the result of decay in wear-cups. Alveolar abscesses are also largely due to attrition and occlusal caries. Proximal caries is present in only 14.3 per cent of the cases.

The limited variety of the food of this people may be given as the reason for the comparative prevalence of caries, the large loss of teeth, and the occurrence of pyorrhea. The Pecos Indians must have owed their good development to heredity, natural exercise, the open air, and simple living. But food insufficiency, bodily exertion in search of food, and lack of hygiene must have been the causes of early physical decline.

#### IMMATURE SKULLS

The skulls of the Pueblo children and adolescents represent ages from seven months to sixteen years. Development is generally good. Two cases, 60,726 and 60,509, both about seven years old, showed a slight palatine ridge or torus. This seems to point also to the conclusion that it is not a structural reenforcement in response to functional demands but that it is the result of continued activity on the part of osteoblasts. No. 60,726 shows marked development of this feature, as well as intimations of mandibular lingual protrusions, and a supernumerary tooth. It shows a marked activity on the part of bone- and tooth-forming agents.

As to the relation of the arches, 25 cases, 75.8 per cent, are normal. Eight cases, 24.2 per cent, present neutroclusion with slight tooth malpositions. No cases of distoclusion or mesioclusion were found.

The tympanic plate, as already stated, shows complete ossification at about eight years of age. Anatomists put the age at five.

Attrition of the deciduous teeth was observed in cases above the age of five. Caries is found in only 12 per cent of the cases. No premature loss of these teeth was observed.

Variations in the location of the gubernacular foramina were observed. This gave me the intimation that the gubernacula seem to have a directing in-

fluence on the eruption and final position of the permanent teeth. The foramina of the maxillary premolars are usually located near the mesiopalatal angle of the palatal root, and their crypts are mesial to the palatal roots of the deciduous molars. The mandibular premolars have their foramina lingual to the lingual median depression that leads to the bifurcation of the roots of the deciduous molars. The crypts are slightly lingual and median.

Separation or spacing of the deciduous anterior teeth is not present in every case at the proper age. In some cases, instead, the process shows labial bulging at the position of the crowns of the erupting permanent teeth, partly due to the enlargement of the process around the crowns and partly to the bending labially of the deciduous roots. This last observation is quite interesting and seems to indicate that the functional demands on these teeth made it necessary to have the roots remain and they graciously bend out of the way.

Observations as to the positions of unerupted calcified caps of permanent anterior teeth were made. It was seen that as the buds in their crypts assumed positions in which the lateral incisors were lingual to the central incisors, and the canines labial and tipped labially to them, the law of inertia governed their eruption in that arrangement (as we quite often see in the case of bunched anterior teeth) unless the inherent directing power of growth, stimulated by exercise and good circulation, helped them to arrange themselves as intended by nature. Many cases showed the calcified caps in positions of rotation and perversion in their crypts. These caps could hardly be expected to correct their own positions but would naturally erupt irregularly placed. These two factors of malocclusion fall under the "force of cell metabolism" (Dewey), but the separation and definition of these important conditions seem to me necessary.

## THE ORTHODONTOSCOPE\*

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THE orthodontoscope is an instrument by means of which casts of the teeth may be reflected upon a plane surface (Fig. 1).

The idea which prompted its development grew from a desire to provide a simple means by which graphs or charts of tooth positions and jaw relations

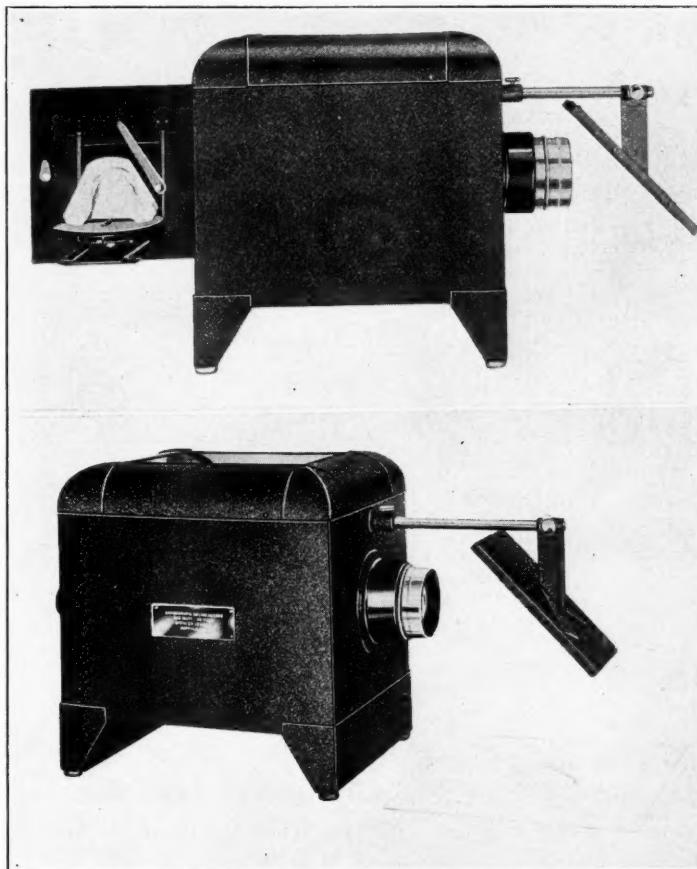


Fig. 1.

Fig. 2.

Fig. 1.—Showing orthodontoscope with cast placed upon the adjustable revolving platform.

Fig. 2.—Showing door closed, cast in focus, and the image reflected on the graph paper ready for tracing. The size of the image is determined by the distance of the graph paper from the diagonal mirror. Four diameters magnification is obtained by increasing the distance approximately four inches.

might be accurately and easily made. Because of experience in microscopic work with the camera lucida, I desired a means of similar facility for orthodontic work. The camera lucida is an instrument in which the light is transmitted through a glass slide on which a thin transparent section of tissue has been

\*Presented before the American Society of Orthodontists, St. Louis, Mo., April, 1931; Second International Orthodontic Congress, London, England, July, 1931; Seventh International Dental Congress, Paris, August, 1931; New York Society of Orthodontists, March, 1932.

mounted. The image is shown on a table below in adjustable degrees of magnification. This greatly simplifies the making of a tracing or drawing. The designing of an apparatus that would reflect opaque objects for similar purpose had been in my mind for a number of years, but only about eighteen months ago did I proceed with sufficient determination to stimulate a manufacturer to produce it (Fig. 2).

In clinical orthodontia it affords a ready means for the making of graphs of the teeth and contiguous parts for study and for plotting of treatment, and for the recording and comparison of progress (Fig. 3).

It facilitates the making of graphs as follows:

(1) In actual size or by enlargement to as many diameters as may be desired.

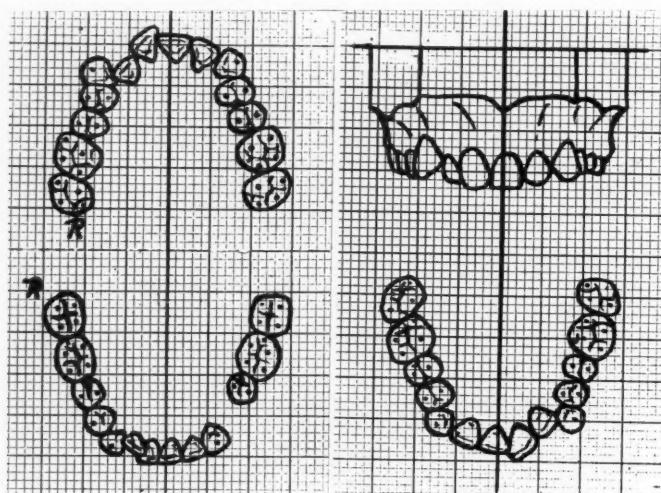


Fig. 3.

Fig. 4.

Fig. 3.—Showing a tracing of a maxillary and mandibular arch with the median raphe in correct register.

Fig. 4.—Showing a maxillary cast drawn in three dimensions in median raphe register. The cast is placed in two positions on the platform, and the image of each position is outlined.

(2) Drawings in three dimensions may be made (Fig. 4.)

(3) Orientation of the dentition with the Frankfort horizontal, and facial profile may be made in conjunction with the profilograph of A. Wolfson. Photography and radiography are eliminated by this procedure (Fig. 5).

(4) The photograph direct from cast to photographic paper may be simply made a print produced in from two to twenty-five seconds, depending upon the kind of paper used. The making of a negative is thus eliminated (Fig. 6).

Some of the important advantages in practice are as follows:

(a) Tooth positions and arch form are recorded in relation to the median raphe.

(b) By making adjoining graphs of maxillary and mandibular teeth and arches in a projected median plane, the symmetry of the two may be compared and studied (Fig. 3).

(c) In treating mixed dentures, the positions of erupting permanent teeth may be recorded free hand, thus obviating the making of an impression and a

cast. This easy means of keeping a record of the exact positions of each successive permanent tooth as it erupts is most important and helpful, and reduces to a minimum the number of casts for record that are made during the progress of treatment (Fig. 7).

(d) At desired intervals in treatment, an impression of the occlusal surfaces only may be made by using but 2 to 3 mm. thickness of impression material without even removing the arches. From this a quick cast is made and reflected in superimposed image over the original graph in exact register of median plane and intermolar line, and the teeth are outlined in another color or by means of dots, and the growth changes are traced for comparison (Fig. 8).

(e) The maxillary and mandibular occlusal relations may be accurately superimposed for the study of cusp and fossae relations, etc. The graphs should

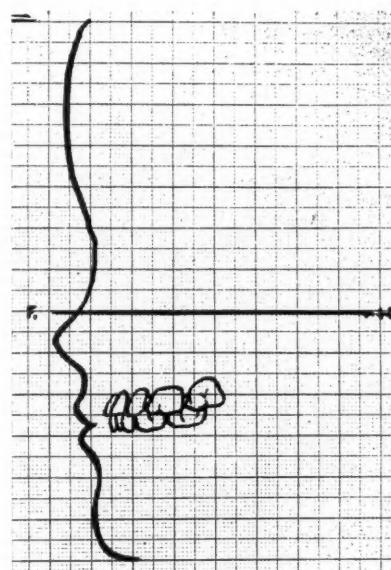


Fig. 5.—Showing orientation of the dentition with the Frankfort horizontal and facial profile, photography eliminated.

be in different colors, and the lower made on transparent paper so as to prevent transposing the right and left sides.

(f) The overbite of anterior teeth may be recorded by placing the casts in occlusion on the stage, upside down with molars toward the lens, and focusing sharp on the lingual surfaces. The gingival border of the maxillary incisors should be made in one color and the lingual surfaces and incisive edges of the mandibular in another. Other applications will suggest themselves to different clinicians.

For demonstration and teaching purposes, the image of the cast may be readily thrown on a screen similar to that of a lantern slide. The movable, revolving stage permits showing the casts from all angles. For this, the mirror in front of the lens is turned upward out of the beam of light, and a longer focus lens, 8 inch to 12 inch, is substituted for the one used in making the graphs. The making of drawings for the illustration of papers is much simplified, and the making of charts enlarged to any desired size becomes only a matter of tracing.

## REQUIREMENTS FOR MAKING GRAPHS

Graph paper, No. 358—14L  
 Plain white drawing paper  
 Transparent tracing paper—heavy  
 Carbon paper  
 Dividers 5"  
 Ruler 6" or longer  
 Lead pencils, No. 2  
 Payzant lettering pen, No. 8  
 Black India ink  
 Red India ink  
 Thumb tacks  
 Boley, or similar gauge (measuring tips ground to a knife edge) marked in hundredth inch  
 Hawley charts—improved set  
 Tracer or stylus of metal, ivory or bone  
 Drawing board, 18" x 24"

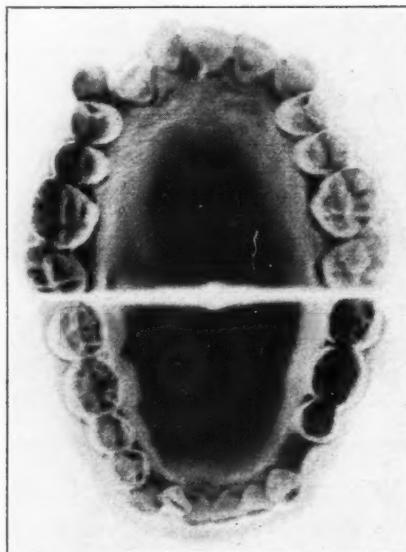


Fig. 6.—Showing photograph made direct from cast, eliminating negative. This shows a negative image. A positive may be produced by reversal development.

## PROGRESSIVE TECHNIC FOR MAKING GRAPHS OR DIAGRAMS

1. Casts should be made from accurate impressions. Plaster of Paris has, to date, continued to prove most satisfactory especially when teeth are very irregular. The "art" portion may be shaped as preferred, but it is best to have the plane distal to the last molars at a right angle to the occlusal plane and to the median raphe.
2. The median raphe is determined and marked on the palatal surface of the maxillary cast. It is projected on the distal plane with the right angle guide included, and a narrow groove, 1 mm. in depth, is made with the hacksaw supplied with the outfit. The mandibular cast is placed in occlusion, and the groove is projected onto the distal plane of the mandibular cast, thus the median line is established on the mandibular cast. The grooves are projected onto the top and bottom planes of the casts if graphs are to be made of the teeth in vertical

or longitudinal sections. The platform in the orthodontoscope has a ridge of metal that fits into the grooves for the purpose of exactly relating the maxillary and mandibular casts in median register.

3. The letter *R* is marked on the right side of the palate near the last molar, and an *R* is placed on the mandibular cast near the last molar. This is important, since without a mark to distinguish the right from the left side, the image of the mandibular cast might easily be transposed by mistake.

4. The intermolar distance is now measured and marked. With a pair of dividers, about 5" size, measure the distance between the summits of the mesiobuccal cusps of the permanent first molars, use deciduous second molars if permanent first molars have not erupted. Press the points slightly into the plaster cusps and mark the depressions with a soft lead pencil so that they will show in the reflected image.

5. Place the maxillary cast in the orthodontoscope, the groove in the distal plane of the cast over the ridge on the platform, the teeth of the right and left sides equidistant from the lens. The door is closed and the lights are turned on.

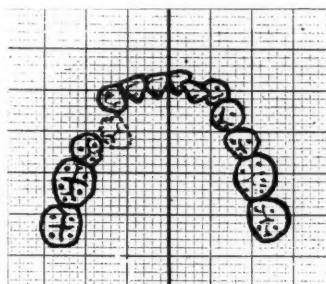


Fig. 7.

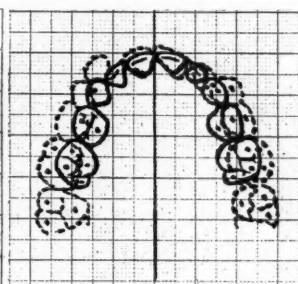


Fig. 8.

Fig. 7.—Showing mandibular left first premolar position traced freehand. It had not erupted when the impression was taken. In mixed dentures this procedure is especially helpful in recording positions of erupting teeth.

Fig. 8.—Solid lines show the positions of the deciduous teeth. The dotted lines show development eight months later.

An image of the occlusal surface of the cast will be reflected from the mirror onto the drawing board. The darker the room, the brighter the image. White paper reflects best. The platform, lens, and mirror are adjusted back and forth until the exact size in sharp focus is obtained. This is determined accurately with the dividers, the points registering the distance between the black dots on the cusps of the molars. If desired, enlargements of the image may be produced by increasing the distance of the drawing paper from the mirror.

6. The graph, or diagram, is now to be made. The ruled sheet of graph paper is placed on the drawing board so that the image is in the desired position. I prefer millimeter paper ruled in green ink (tenth line heavy, No. 358-14 L) to which I add a heavy line in red or black ink which serves as the median raphe guide. This is now moved into position so that the median lines of image and graph paper merge or coincide, and is carefully fastened with thumb tacks. Carbon paper with the carbon side toward the graph paper is now placed, and over this a sheet of plain white paper of proper size with median line ruled is now carefully placed with median lines superimposed and fastened with thumb

tacks. The actual drawing is now to be made. The white paper reflects the image clearer than the ruled. In a well darkened room, draw direct on graph paper. One may begin with any tooth preferred. The permanent first molar when present, or the deciduous second molar, if purely a deciduous dentition has been our choice. With the drawing pencil, now accurately dot the summits of the cusps, and carefully follow the outline of the occlusal surface, filling in the fossae and grooves as desired. Repeat with all the molars and premolars. With the incisors and canines, dot the mesioincisal and distoincisal angles and outline the full width of incisive edges, and, if desired, the lingual surfaces to the gingival border. Considerable individuality will be developed in making the drawings, the important desideratum being uniformity. When all the teeth of the maxillary cast are drawn, the cast is removed from the orthodontoscope, and

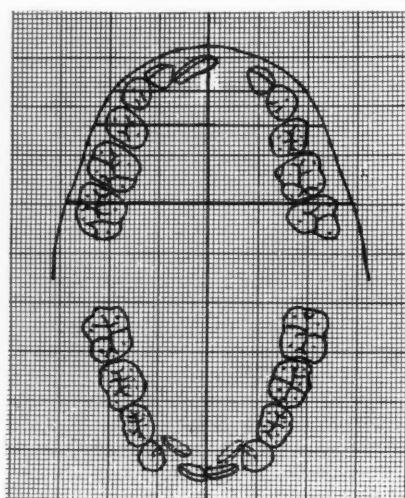


Fig. 9.—Showing graph of casts oriented with Hawley chart as a general guide for average arch form. The progressive growth characteristics of each patient become the final guide to the individual normal arch form and the occlusion of the teeth.

the mandibular cast, after having been measured and marked for intermolar width, is placed in the same position as was the maxillary one. The graph paper is now loosened and rotated halfway around so that the distal plane of the mandibular cast faces that of the maxillary, or, in other words, so that the molars are contiguous and the incisors are toward the edges of the graph paper. *This is important so that the maxillary and mandibular right and left sides are correctly related.* This will be proved by the letters *R* marked on the two casts which will show on the same side. The mandibular cast is now focused for size, being measured with the dividers, and is marked and traced as was the maxillary cast. This results in outline drawings of the occlusal view of the maxillary and mandibular teeth in exact median register. Thus two graphs have been made, one on graph paper and one on white which may be used for preliminary charting if desired. The principal object of the white paper is to obtain a clearer reflection, especially if there is difficulty in darkening the room. If a dark room is used, the image will show clearly enough to be outlined on the green

graph paper. Now all is ready for study for the outline of the initial steps in treatment. For this, we have found Hawley's charts to be helpful, as a general guide. The improved set is much to be preferred. The central incisors are very accurately measured in the mouth, not on the cast, with the Boley or similar gauge, the laterals and canines also being measured if erupted, and the corresponding Hawley chart selected. Transparent tracing paper is now fastened over this chart, and a tracing is made with the median and intermolar lines in proper register on the graph. The intermolar line in the Hawley chart extends from the buccal groove of the permanent first molar. When the tracing is completed, the transparent paper is placed over the graph in exact register, fastened with thumb tacks on one edge, and the carbon slipped between transparent paper and graph. With the stylus, the arch outline and transverse lines are now heavily traced so that the carbon paper will register on the graph paper. The thumb tacks are now removed, the sheets separated, and with the lettering pen and India ink, the carbon lines are overtraced (Fig. 9). The margin of the chart may be used for any data desired, such as for the distance and direction of tooth movement desired, for recording missing follicles, etc.

It is a good plan, after a period of treatment, to make casts of the occlusal surfaces of the teeth, mark the median lines, and make superimposed tracings which will show very definitely the horizontal changes which have taken place.

Drawings of the labial, buccal and lingual surfaces may also be made, the only difference being in the placing of the casts in the orthodontoscope.

#### DIRECT PHOTOGRAPHY

This must be done in the dark room. The orthodontoscope is covered with a heavy dark cloth to prevent escape of light. The procedure for focusing the cast is the same as that for a drawing, except that the sheet of white paper is placed in an ordinary photographic printing frame. When the cast is sharply focused to the desired size, turn off the lights in the orthodontoscope and substitute in identical position a similar printing frame loaded with the photographic paper on which the print is to be made. Snap on the light in the orthodontoscope for the required number of seconds to make the print. This will vary somewhat according to the kind and voltage of electric current used. As a general guide, it will take about three seconds with bromide paper, twelve to fifteen seconds with Velox printing out paper, and twenty-five seconds with Azo paper. The exact time will have to be determined by trial in each locality. At the end of the proper exposure time, snap off the light in the orthodontoscope and place the paper in the developing solution and proceed as with ordinary prints from a negative. The resulting photograph will be a negative print. By doing "reversal development" a positive print is produced. If much printing is to be done, a photographic lens with an iris diaphragm is recommended.

And finally, may I reiterate that this instrument was designed and produced for the purpose of facilitating the making of graphs of the teeth and dental arches, to simplify the study and plotting of treatment, and the recording and comparison of changes in the dental arches whether under observation or under active treatment. It is in no sense to be considered as a means for the pre-

termination of the ultimate arch form. This I consider to be an intricate and gradual developmental process rooted in the secrets of biology, and to me the terms biology and predetermination are positively and diametrically opposed.

In conclusion, I desire to state that my interest in the orthodontoscope is purely scientific. I hope that others will find it as helpful an adjunct as have I, both in teaching and in practice.

## DEPARTMENT OF **CHILDREN'S DENTISTRY**

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### **Department of Children's Dentistry**

IN ACCEPTING the editorship of this new section of **CHILDREN'S DENTISTRY** I am not unmindful of the responsibility encumbent upon me. I am truly grateful for this opportunity of presenting to the great host of readers and students in our profession, as well as allied professions, material, methods, needful and useful information, and frankly, a better understanding of the whole problem of serving adequately and correctly, the boys and girls of this and all generations.

There is not to my knowledge, a dental periodical anywhere in America which presumes to have a specific section given over to the work of Children's Dentistry or, as the specialty has been termed, Pedodontia, in which regularly and monthly beneficial and interesting information may be disseminated to members of the dental profession throughout the world. It is to be remembered, of course, that the primary purpose of a scientific journal is to contribute all within its power to the legitimate and wholesome development of the particular department of science which it expects to serve. It must not be unmindful of the things which are desired by the majority of its readers. For instance, the editor takes the big, broad perspective of the majority rule in a scientific matter, and is not under any circumstances to view any given situation entirely from his own viewpoint. We do believe that children's dentistry is in its infancy and coming along fast, that it has a great future, comes under the general head of prevention, is the basic foundation of prevention in all dentistry, that it ties in beautifully with other phases of dentistry, that our readers are vitally interested in the subject, that this is an appropriate time for the advent of a department on this subject in a dental journal of proved and appreciated merit, which fortunately has an international following.

There will be presented from time to time original papers given before scientific and professional groups, articles written exclusively for this section on all phases of children's dentistry. These articles will be contributed by dentists, physicians, hygienists, assistants, school and college professors, social workers, and all those people who have to do with the successful handling of children and their relation to the profession of dentistry. These papers will be selected from every geographical section; they will treat of every matter of useful and vital information for those working with and serving children in dentistry and its allied branches of the healing arts.

It is my belief that due to the fact that many general practitioners of dentistry who graduated in the period before 1920 were not given very much if any instruction on child psychology, methods of correctly serving the child in a

dental practice, important points of diagnosis wherein these points are distinctly differentiated to serving adults in dentistry, the selection of filling materials, of correct cavity preparation, of gaining and holding child patients, of establishing proper fees which will be understood, appreciated and paid by the public, and of a manifold complexity of necessary knowledge if children are to be handled and correctly and successfully served in dentistry, that today more than ever before the rank and file of dentists are more assuredly conscious of their need of instruction, help and information which will enable them to serve adequately and successfully their prospective and present child patients as they really wish to.

Within the past five years I have had letters from dentists in every state in our nation, from seven foreign countries, imploring and urging that I send them basic information on serving children in a dental practice. The public everywhere is still woefully ignorant on many dental matters, but due to the fact that health workers, school teachers, pediatricians, some dentists, intelligent and well informed parents have been preaching and teaching this subject of mouth health and its important relation to body health and success in life, many children and parents are insisting and demanding that children receive the attention and consideration they rightfully deserve at the hands of the dentist.

Many dentists find themselves in a rather embarrassing position; they are not equipped to serve children correctly; they were never taught to serve children in the dental college; they have too long neglected to encourage parents to send their own children for attention; and now, with the public demanding dental services for children, the dentist who has not had college training, who has not kept abreast of the trend in our profession, who has failed to correlate the preaching of the workers with his own practice, is not only embarrassed but is actually losing his long established practice and position in his community and profession.

Dentists have written me that they cannot obtain postgraduate instruction from any recognized dental college on children's dentistry; they are forced to visit with and study under some of the men and women who have given their full time to serving children for a long number of years, and who have learned themselves by experience, by association with similar workers and specialists all over our nation. The position is similar to what it was in our profession when crown and bridge instruction first came in, when the inlay technic was perfected, and truly it must be said that the dental college today which does not adequately instruct its students as it rightfully should in methods of children's dentistry which are approved and practical has failed to equip and prepare its students as that college should, and has not treated fairly the great profession of dentistry which claims now more than ever to be helpful in that it can prevent to some degree the dental diseases to which we seem heir apparent.

I love children's dentistry, I sincerely believe it is the greatest single phase of work for the benefit of mankind, our profession can do. With the exception of accidental and congenital defects, every other specialty in dentistry save orthodontia would have its work and importance minimized, should the child receive our attention. Truly the dental profession as all worthwhile professions

must inalienably and sincerely work daily for those consummate ends which will make the need for our profession unnecessary.

This new section will welcome and appreciate the suggestions, advice and constructive criticisms of all its readers and students. It is our hope that we may merit our being invited to have a part in the journal's work and its great responsibility to its subscribers, and mostly to the people we serve, and are obligated to serve to the utmost of our scientific knowledge, professional ability and humanitarian foresight. While it certainly is deemed an honor to be asked to serve, only the love of the work, the belief in the cause, and the hope that this section will help and inspire some worker with children to give them the chance they rightfully deserve at our hands, are all that will ever keep your editor happy or assure him a feeling that this new section merits its place in your time or thought.

—W. T. McF.

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#### OPERATIVE DENTISTRY FOR THE CHILD\*

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M. O. TURRENTINE, D.D.S., COLUMBUS, GA.

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WHEN the late G. V. Black wrote his book on operative dentistry more than a quarter of a century ago, he included two chapters on the care of children's teeth. A few years later Evangeline Jordan decided to practice children's dentistry as a specialty. These two earnest workers have laid the foundation for the advancement of this branch of dentistry. It was not until recent years that much attention has been given it. A group of capable and hard-working men and women have devoted their time and energy to the education of the public in matters of preventive medicine. Through their efforts they have attained the recognition of dental defects in children's teeth as a menace to the health of children.

Every health program in any well organized community includes a mouth examination. This has created a demand for skillful diagnosis and work by dentists in private practice. It is now the duty of every man in the profession to take care of the teeth of his young patients or to refer them to some one who can and will; otherwise, public education will be far in advance of the cooperation of dentists.

Too long the rank and file of the profession have been supine in this particular; too long and too frequently have we heard the vapid remark, "It's only a baby tooth," that pernicious and destructive doctrine that has sounded the death knell of health and function in many a helpless and unfortunate child. It is the inalienable right of every child to be vouchsafed the protection afforded it by the prevention of disease and the preservation of health, at least to the very appreciable extent that this can be brought about by the adequate care of the mouth and teeth.

Granted that there are many of our technical problems that we are still unable to solve in our attempt to minister to children, and granted that we get

\*Read before the Fourth District of Georgia Dental Society, April 7, 1932.

far from 100 per cent cooperation from the parent or the child, the patent fact still remains that we have fallen far short of our greatest possibilities through failure to devote our best energies to the promulgation of the knowledge we do possess, or to take advantage of the opportunity for service that has been offered us by the people.

That we are dealing with children's teeth is no reason for believing that the operative procedures are very different from those for permanent teeth. A deciduous tooth has many of the characteristics of a permanent tooth. It has the same shape and form and is composed of the same material. The cavity must be carefully and accurately prepared, otherwise the filling will not hold. The filling materials are generally the same and manipulated in the standard way. Contacts must be restored and finally it is essential to polish the filling.

The principal difference lies in the conditions under which we must work: The patient is harder to keep quiet, the dentist does not like to hurt the child, there is a copious supply of saliva, the mouth cavity and teeth are small, and there is present the ever-wiggling tongue.

As to the restlessness of the patient, a great deal depends on the operator. Some have the ability to hold the child's attention; others do not. For these latter, it is possible to acquire the knack if one will but try. The subject of child psychology has a place all its own, and I shall not attempt to discuss it at this time.

One must learn how to manage the case where there is a copious amount of saliva. I find that generally a child does not object to a saliva ejector, especially when approached with the idea that he is assisting you in the operation. Cotton roll holders are often helpful. Often, however, the hard edges of commercial cotton rolls are in themselves irritating to the tissues and increase the flow of saliva. Best results are then obtained by twisting a small wad of cotton into an improvised roll. When all else fails, I have found that by holding a cotton roll on each side of the tooth with the fingers of my left hand I am able to cope with the situation. While this is rather tiresome for the operator, I find it a very effective method of keeping the tooth dry.

If the tongue becomes too active, by telling the patient to take a deep breath, we can usually attract their attention to the breathing and they forget the tongue.

In preparing the cavity, I find it advisable to start with hand instruments. Many children are afraid of the bur, because they have heard an adult, or other children, relate experiences with the drill. All instruments and burs should be sharp. I begin with a chisel and with it outline the cavity. I excavate with spoon excavators until all the caries has been removed, and finally, with a bur gently and slowly complete the cavity preparation.

If the cavity is a proximal on a molar a step broad and slightly dovetailed must be cut on the occlusal surface unless there is no approximating tooth. The occlusal step gives the necessary anchorage. I have seldom seen a proximal filling in a deciduous molar remain in place, unless there was a good occlusal step for retention. Failure to provide this step, I feel, is one of the most common reasons for poor results in filling deciduous molars.

Another mistake often made is to cut away too much of the lingual and

buccal walls. To obtain good anchorage it is necessary to maintain as much of these walls as possible. The more that is cut away, the deeper into the axial wall and the gingival wall must the cavity be extended. This brings the axio-gingival angle near the pulp and at this point most of the accidental exposures are made. It must be borne in mind that in proportion the pulp chamber in a deciduous tooth is larger than the pulp chamber in a permanent tooth. If during cavity preparation the child suddenly complains of pain, this is a warning that the instrument is very close to the pulp and it is well to make a careful investigation. Keep away from that point and place an insulator over it.

Chemically pure zinc oxide—chemically pure because ordinary zinc oxide contains traces of arsenic—mixed with eugenol into a very thick paste is a very effective capping material. Just enough paste should be applied over the deep spot to cover it lightly. A zinc-oxyphosphate cement base is placed over the capping. In cavities of any depth it is advisable to follow this procedure because most pulps die under large metallic fillings in deciduous teeth from thermal shock or a minute exposure of the pulp which might have been saved with a capping.

When the otherwise well behaved child begins complaining of pain, and there is still a large amount of carious dentine in a large cavity, undoubtedly there will be an exposure of the pulp. One of two choices remains: Either to expose the pulp deliberately and treat as a healthy vital pulp or to take a chance at capping. Either of these procedures will keep the operator guessing. I prefer, if I feel that there is a possible chance of maintaining the pulp in a healthy condition, to take this chance, have the patient return at frequent intervals for a period following for examination, and on the first evidence of devitalization, should it occur, follow the treatment outlined by Dr. Charles A. Sweet of Oakland, California, in a paper given before the American Dental Association meeting in Washington, briefly outlined as follows:

1. On the first visit the pulp chamber is thoroughly opened, washed out with a warm spray and any particles that can be seen are removed with spoon excavators and explorers. After the cavity has been dried, a treatment of formo-cresol is sealed in for forty-eight hours with a temporary filling.

2. On the next visit, the teeth are isolated, cotton rolls and saliva ejector being used if necessary, and sterilized. The first filling is removed and the upper one-third of the root canal thoroughly cleaned out with a broach, care being observed that we do not pass the broach too far down the canal, and so force infected material through the apex. Formo-cresol is again sealed in with temporary stopping, the patient dismissed for three or four days.

3. At the third visit, the root canals are completely cleaned out with a broach after all necessary precautions have been taken to keep the tooth free from saliva or contamination. The tooth is made ready to receive the root canal filling and restoration, as no further cleansing will be done. Formo-cresol is again sealed in with temporary filling for three or four days.

4. At the fourth appointment, the tooth is isolated with cotton roll, thoroughly washed with alcohol and kept free from saliva by the saliva ejector, the filling substance is removed and a thick creamy paste of zinc oxide and

eugenol is placed in the pulp chamber and forced into the root canal with a pellet of cotton, or by the use of root canal pluggers, if necessary. The pulp chamber is filled with crown and bridge cement and the tooth restored with alloy.

While I admit that I have not been as successful with this procedure as Dr. Sweet reports, I do feel that my results have been successful enough to warrant my calling this to your attention, for if we can retain these teeth as natural space retainers without impairing the health of the child, I feel it is certainly indicated.

It is important to notice before cavity preparation is begun whether the mesiodistal length of the molars has been shortened because of the loss of tooth structure; if length is lost, trouble will arise when premolars erupt. In order to secure the necessary separation, I pack and slightly overfill the cavity with base plate guttapercha; this should remain for at least three or four days and it will tend to wedge the teeth apart. I feel that too great mesiodistal length is better than not enough.

In the filling of proximal cavities of molars with amalgam, a matrix should always be applied. When the amalgam has set sufficiently that the matrix can be removed, I bend the end of the matrix away from the filling, cut the end from the matrix on the lingual side, then with the buccal end grasped with a plier pull carefully through the proximal space. I never pull the matrix through at the occlusal aspect, as usually the filling comes with it, or it disturbs crystallization so that a greatly weakened filling results. Carefully carve the filling to occlusion, or when the child bites the filling will be cracked. Polish at a subsequent sitting. When there are approximating cavities in molars, I think it advisable to fill them at different sittings, as in applying and removing the matrix from the second filling, we are likely to disturb the first.

I prefer silver amalgam for these restorations, because it does not dissolve proximally as does cement. The mesiodistal length is maintained. It is a good wearing material, and when properly handled should last as long as the deciduous tooth remains. At all future appointments, the dentist should look for shiny spots on the filling as the amalgam does not wear down as rapidly as the enamel, and consequently, occlusion will be slightly interfered with. Such disturbances should be carefully avoided in the developing dentition.

Copper amalgam has been called by some operators the ideal filling material for children's dentistry. This substance has advantages and disadvantages—the former sufficiently outstanding to counterbalance the latter, if taken into proper account. The principal disadvantages are its color, slow setting time and tensile strength. Chief advantages are: low coefficient of expansion and contraction, germicidal action and low coefficient of conductivity.

The low coefficient of expansion and contraction prevent the amalgam from contracting away from the margin of the cavity. It frequently remains in cavities that have but very slight retention. The germicidal action prevents the recurrence of the caries, but must not be relied upon to arrest active decay. The low coefficient of conductivity is an extremely valuable asset, as so many fillings inserted in deciduous teeth closely approximate the pulps.

Another advantage frequently offered for copper amalgam is that it may be

inserted in a wet cavity. It is to my mind doubtful that any filling inserted in a wet cavity will be so successful as one inserted under more ideal conditions. It has been my experience that a child who cannot be managed to the extent of keeping the cavity dry for the insertion of a filling is extremely rare. However, if the copper amalgam becomes wet, it may be dried over the flame or on a towel and used without danger of having the filling fail. The setting time of copper amalgam can be greatly reduced by decreasing the quantity of mercury. This seems also to increase the strength of the alloy. I use a small test tube for heating the copper amalgam pellets and triturate with the mortar and pestle just as with silver amalgam; when a smooth uniform mix is obtained, express the mercury by means of pliers and chamois skin, this produces a dry substance apparently unsuitable for use but when manipulated in the palm of the hand becomes plastic again. This mix will set into a fairly hard and dense filling within three or four hours. Caution parent and child against eating any hard food for the next meal, and no chewing on the side of the mouth containing the new filling for twenty-four hours.

Cements were in former years most commonly recommended for children's dentistry. Experience has taught, however, that cements are largely makeshifts, giving on the whole unsatisfactory results, yet they are useful for filling cavities that will in teeth be lost normally within a few months. Some brands of copper cements have been advertised as possessing extensive germicidal action. Bacteriologic tests indicate some action, but not to the extent supposed, the action being less than copper amalgam.

I have had some very satisfactory results with the use of germicidal kryptex in pits and fissures. If this material proves to be as useful as the manufacturers claim and as the limited usage to which I have placed it indicates, I feel it shall be a very valuable material.

The use of silver nitrate has been recommended for anterior deciduous teeth. The decayed surfaces polished with sandpaper disks, silver nitrate applied, and reduced with eugenol. I do not like to use silver nitrate. First of all it discolors the teeth, and the child loses interest in the appearance of his teeth. It is a very dangerous drug to use. In a weak solution it is not very effective, in a strong solution it burns deep into the tissues if by accident it should come in contact with them. Common salt, its antidote, should always be at hand to be applied immediately in case of accident.

I am also afraid that silver nitrate is often used to cover an area which might better have been removed with an excavator. It gives the operator a false sense of security when decay is thus treated.

The silicate cements are contraindicated because they usually cause death of the pulp.

Zinc cements usually wash out rapidly, though I have had cases in which very good results were maintained with oxyphosphate of zinc cements.

Elsie Gerlach, of Chicago, advises the use of zinc oxide mixed into a very stiff paste with eugenol. I have used this technic with varying results. Possibly my failure to follow her technic closely, or considering its limitations, account for much of the disappointment I have met in using her technic.

Her statement on this question is: "I have found that when zinc oxide is mixed into a very stiff paste with eugenol it acts as a satisfactory filling material. Because it is nonirritating to the pulp, the cavity may be made very deep, and thus retention be gained. It does not develop heat while hardening, and the fluids of the mouth do not affect it."

Its disadvantages are that it takes about an hour to become hard in the tooth. Contacts cannot be restored with it because it is brittle, and does not stand stress.

But while some of it may wear off, usually the portion in the deep part of the cavity remains without change, thereby protecting the vitality of the pulp. It is also of a chalky white appearance, which makes it conspicuous, but this is preferable to the silver nitrate discoloration recommended by some operators.

Probably all of you have experienced the feeling of discouragement arising when a four- or five-year-old child comes to you with all the anterior proximal portions of the teeth decayed. Usually the teeth are small, thin and crowded, painful on which to work. I use a small inverted cone bur to prepare the cavity, being careful not to destroy more of the labial and lingual walls than is necessary, in order to retain depth for retention. Then, I fill this with zinc oxide paste and instruct the patient not to eat for at least two hours. This allows sufficient time for hardening.

When the boys and girls of today are given the benefit of the knowledge we at present possess, and we devote ourselves with solicitous care to the maintenance of health and the prevention of disease and deformity among the rising generation, then, and only then, shall we stand acquitted of the insistent obligation that is ours and hold our profession worthy of the respect and admiration of the world. Toward this happy consummation I commend the attention of everyone to whose care children are committed, with the assurance that through the medium of this service lies our greatest opportunity and our most inspiring achievements.

## EXODONTIA, ANESTHESIA, RADIOGRAPHY IN CHILDREN'S DENTISTRY\*

DR. GEORGE P. EVANS, JACKSON, MISS.

FRANKLY, the same cardinal principles of radiography, anesthesia and exodontia in adult dentistry are applicable in children's dentistry or pedodontia, and although what you may derive from this particular paper may seem somewhat of a repetition of things propounded and discussed many times before, if I can portray one single operation to just one member of the body represented here, that will be helpful in the carrying on of his profession as applied to his work with children, then I shall feel my labor has not been in vain.

Now as to the uses of radiography, anesthesia and exodontia in children's work, how and in what manner do their technie differ from that used in adult dentistry? Children's dentistry could best be defined as that particular branch of the dental profession having for its purpose the preventive treatment necessary in the mouths of children of prenatal, preschool and school age up to the time when the adolescent period is usually reached. Tardy dentition may prolong this relationship but personally I make it a part of my procedure to bring the dental contact with the child to a close after the twelfth year molar has erupted, which you are all aware normally happens about the twelfth year. The presentation of this paper can best be handled as any dental procedure: namely, first the proper radiographic diagnosis, next the problems of anesthesia and then the actual technie in the removal of teeth, known as exodontia.

Children as a rule are difficult patients where an x-ray examination is necessary, due to their physical make-up. Film packets are not so well tolerated, lack of muscle coordination prohibits children from keeping still for any length of time, and due to previous tonsil and adenoid operations they have become white coat shy and hesitate to do anything that can be avoided. The same application is made of radiography in children's work as in adult dentistry with few exceptions. The first point to consider is, the recommendations for radiographic service have been presented as they have arisen for the last twenty years, and it is the neglect of the routine application of radiography that we as dentists are subject to the greatest criticism. In the rush of practice and in the difficulty in handling your patient we are apt to accept the compromise in radiographic service. The ideal radiographic examination for thorough oral diagnosis in children's dentistry is twelve intraoral films; namely, three views of the maxillary incisor region, one of the mandibular incisor region, one of the canine region, and one each of the molar regions. The premolars are included in the canine regions as well as in the molar examination. Along with the above mentioned radiographic examination, it is also necessary to get a correct bite wing exposure of all the teeth present. Our reason for this is to have before us a definite picture of the interproximal spaces of which I shall speak later. With this x-ray

\*Read before the Mississippi Dental Association at Meridian, Mississippi, June 10, 1932.

picture before us we are now able to attempt proper diagnosis of any of the conditions presenting themselves which we as dentists are called upon to correct or at least aid in their correction. I realize it is not necessary for me to go into detail as to what we may find and to what use we can put our findings but I will mention here the most important uses to which we can apply our radiographic examination. Diagnostically, the bite wing radiogram discloses to us the presence and extent of interproximal caries which is sometimes rather difficult to find with an explorer, especially in the region of the deciduous molars and contact points between the first permanent molar and second deciduous, due to the width and proximity of the contact points. With a proper dental radiogram the extent of decay in any tooth is well defined, and along with the picture we also get the correct size and location of the pulp, knowledge which is of paramount importance if we are to attempt correct procedure. We are all aware of the fact that the size of the pulp chamber in both deciduous and permanent teeth is not uniform and our radiograms are without a peer in cavity preparations.

Root canal therapy in children's dentistry and adult dentistry is somewhat similar with the chief difference that we are dealing usually with absorption rather than growth of root and it becomes necessary to keep this in mind when doing root canal work for children. Some of the pictures presenting themselves and which only the radiogram exposes are pathologic or physiologic resorption, multirooted teeth with uneven resorption of roots, the fact that resorption does not always start at apex but may begin at the side, center, or in case of multirooted teeth at the point of bifurcation. Proper radiographic diagnosis is far more difficult and confusing in this particular branch of dentistry and necessitates careful follow-up examination.

The uses of the radiogram in connection with prosthetics in children's work is used to check up on the eruption of permanent teeth where it becomes necessary in order to maintain proper space in the jaws, using the deciduous teeth as the medium, as in the case of anterior bridge work, different types of plate work and space maintainers of varied constructions.

Full radiogram procedure is essential in the practice of orthodontia. The importance of locating and removing any pathologic condition, roots and teeth, and to do the proper operative work where cavities are concerned, especially on those teeth to be banded, also the picture so necessary, that of root and bone development, which cannot be successfully determined without x-ray diagnosis.

The ideal anesthesia procedure where children are concerned is dependent on so many varied conditions that one could spend the time allotted for this paper on that one subject. For my own convenience and because of their correlation I shall at this time take up with anesthesia, the subject of exodontia. The subject of anesthesia we will classify into four groups as follows: (1) No Anesthesia, (2) Topical Anesthesia, (3) Local Anesthesia, (4) General Anesthesia. In the practice of children's dentistry I know of no other subject which presents so many difficulties as anesthesia and exodontia, if we are to handle children properly and create in the minds of those little tots who come to us for professional care the desire to return for future dental work. Time was when main strength and awkwardness sufficed in the handling of the child, but the day is fast ap-

proaching when the practitioner who does not study the proper psychologic handling of children will find his practice going to the fellow who does. As the different types of extraction present themselves it naturally follows that certain plans of anesthesia are indicated and our best judgment should come in place at this time. Having already classified anesthesia into four groups we will take up types of extraction indicated in each.

The first study we should make is of the child, for every case presents a different make-up. Do not fail to do this, for it may be the deciding factor that accompanies a successful operation. Time prohibits my going into the subject of child psychology in detail but I will take it for granted that if interested in children you will equip yourself in this particular line. First I want to take up the *no anesthetic* stage in connection with extractions of children's teeth. The case presents itself, say any child from three to six years old as an example, scared to death, with a broken-down tooth in the mouth and all that is left is the very loose root or fragment of tooth or process housed in an infected, inflamed area. Don't you think it far more acceptable to remove this particular condition at once, where we can just pick or flip it out rather than subject the child to the unnecessary procedure that is indicated even in topical anesthesia? Instrumentation is the one thing we should keep hidden as much as possible, when dealing with children, especially those young tots and those who are making their first trip to the dentist. I might add here that cotton pliers, either opened to be used as forceps or closed to use as an exolever is about the only instrument needed for this particular extraction.

*Topical anesthesia* in connection with exodontia has several uses. Where it is used as the only anesthetic in the operation we must necessarily know what type patient we are dealing with, use good common horse sense and be sure that enough root absorption has taken place and that the looseness of the tooth to be extracted merits this type of anesthesia. Always dry your tissues and keep them dry before using the desensitizer and apply it around the neck of the gum to be extracted with a pellet of cotton. Keep the area dry and next apply Talbot's iodoglycerol for its antiseptic value. If it is possible and more than likely it is, one's fingers make the best forceps where topical anesthesia is indicated. If we find we have misjudged our case it then follows that we must resort to forceps or exolevers.

We now come to the subject of *local anesthesia* dividing it into two classifications known as *infiltration* and *conductive*. I might state here that I find *conductive anesthesia* not so necessary in children's work and therefore use it very seldom. The real job of exodontia in my work is either done under local infiltration or general anesthesia. If you can extract a tooth for a child without pain I know of no other plan of practice building that will pay as good dividends, for you not only win the parents' admiration but the child will be your servant from then on and your best booster.

The first rule I should like to present to you in your exodontia program, is, never extract a tooth for a child, especially, under infiltration, where you have an edematous area accompanied by infection, on his first visit, unless you can establish drainage and by treatment relieve the presence of swelling and part

of the infection making it possible to remove said tooth perhaps a few days later. Beware using the needle in infected areas, due to the fact that where we have a loose arrangement of growing bone and surrounding tissue infection is picked up and scattered by the lymph and blood streams more readily than is the case in adult tissue and bone. This simple technic will answer the purpose for extraction under the infiltration method. First dry your tissues and keep them dry, take a small pledget of cotton saturated with Abbott's desensitizer and apply to each point of injection for at least one minute. Paint the operative field with Talbot's iodoglycerol for antisepsis. Make four injections, one each into the free margin of the gum around the gingival margin of tooth in an apical direction. When the last injection is completed wait a few seconds and extract. We see no reason for deep injections in the deciduous tooth extractions believing if we relieve the pressure of forceps or exolever at toothneck we will have succeeded in extracting painlessly. If the tooth socket needs a dressing or packing Abbott's anapain is used.

My preference as far as *general anesthetics*, especially in children's work, is nitrous oxide and oxygen gas. You are all aware as to the safety in gas anesthesia as compared to other general anesthetics, if handled properly, and also the so much desired results we obtain with its use from a postoperative standpoint. Difficult oral surgery problems often present themselves to the children's dentist where gas anesthesia is indicated, which I will enumerate: (1) Cases, and there are plenty of them, where we find in the mouths of children a goodly number of extractions. (2) Cases where so much infection is present that infiltration methods are contraindicated. (3) Used with children having difficult single deciduous extraction (4) Curettements (5) Opening of abscessed conditions to establish drainage (6) In any number of cases presenting themselves, such as temperament and physical make-up that prohibits a successful operation under any other anesthetic but a general. In cases where long operative procedure is necessary then the combination general anesthetic of gas and ether is used.

Radiography as applied to oral surgery and pathologic conditions in children's dentistry serves us by portraying the conditions present with both a deciduous and unerupted permanent tooth. The importance of a radiogram in this particular cannot be overstressed for we are usually dealing with two teeth instead of one when extraction cases are presented and therefore have need of radiograms for proper diagnosis. Some of the conditions found that are of importance, especially to the exodontist, are: Lack of root resorption, resulting in difficult extraction, impacted first molars, malposed teeth, impacted canines, impacted premolars, apical abscesses, broken-off deciduous roots, infection involving secondary dentition, surgical assistance in the tardy eruption of teeth such as cicatricial tissues overlying the permanent incisors, fractures, tumors, cysts and any abnormal growth which has its origin in the oral cavity.

This brings to a conclusion this humble effort but before saying, "It is finished," in my studies of the past year I ran across an editorial written by one of dentistry's most beloved characters, Dr. C. N. Johnson, and because of its connection and wonderful truths, I am going to use it as the closing chapter of this paper.

"The tendency toward greater emphasis on the necessity of caring for the teeth of children is constantly growing. Though much has been said on this subject, it is a lamentable fact that there is still an appalling neglect in this particular. If this were not true, we would not have the amount of tooth trouble that is apparent everywhere, because the proper observance of mouth hygiene among children would prevent many of the later manifestations of dental disorder in adults. By mouth hygiene, we mean the maintenance, in all of its manifestations, of hygiene of the mouth, which in turn means the suppression of all kinds of conditions inimical to the welfare of the child. We mean the filling of cavities the moment they appear, we mean the kind of mouth hygiene that insures the perfect performance of function and the greatest comfort to the growing-child.

"Too long the rank and file of the profession have been supine in this particular; too long and too frequently have we heard the vapid remark, 'It is only a baby tooth'—that pernicious and destructive doctrine that has sounded the death knell of health and function in many a helpless and unfortunate child. For what were these children given to us? To be cherished with solicitous care, or to be condemned to the handicap of neglect and physical disfigurements? In this fair nation of ours, there should be no two answers to this question. It is the inalienable right of every child in America—in the world, in fact—to be vouchsafed the protection afforded it by the prevention of disease and the preservation of health—at least, to the very appreciable extent that this can be brought about by adequate care of the mouth and teeth.

"Think of the very great improvement that would be evident in the adult population of this country today if mouth hygiene had been conscientiously maintained in the childhood days of the previous generation. Think of the appalling conditions that we often see as the direct result of the neglect of these same children.

"Granted that there are many of our technical problems that we are still unable to solve in our attempt to minister to children, and granted that we get far from one hundred per cent of cooperation from the parent of the child, the patent fact remains that we have fallen far short of our greatest possibilities through failure to devote our best energies to the promulgation of the knowledge that we do possess, or to take advantage of the opportunity for service that has been offered us by the people.

"Let us cite the one instance of orthodontia. Too frequently have children been permitted to grow up under the handicap of deformity and lost function simply through neglect on the part of the dentist. Mostly this is the fault of the general practitioner, who ordinarily sees the child before the specialist has had a chance to observe conditions and suggest a remedy. Much of the trouble and grief which the orthodontist is called on to witness is occasioned by previous neglect on the part of the general practitioner, who has soothed the parent into a sense of false security by instructions to the effect that the child is growing and thus the condition will likely remedy itself. How many a hopeless and pathetic case of deformity has come to the orthodontist, to try his soul and appeal to his humanity, just because some practitioner has spread the doctrine

that Nature knows what she is doing and will take care of herself if we just let her alone. With the haphazard heredity of race and the multiple manifestations of environment encountered in this nation, Nature uncontrolled makes a sorry mess of the teeth and mouths of children. And how much of this might be avoided by a little wise direction and a little timely attention when untoward conditions are first noted.

"With the enlightenment of the present age, we can no longer seek to absolve ourselves of the charge of carelessness—we were just going to say criminal carelessness—if we fail whole-heartedly to study conditions in the mouth of every child committed to our care. We prate a good deal about prevention in these latter days, and are seriously in earnest when we urge the necessity for prevention, but the pathetic fact is that for the most part we are turning our eyes toward a shadow, when the very substance of things lies close at hand neglected. The only real prevention comes through the medium of early and judicious attention to children.

"When the girls and boys of today are given the benefit of the knowledge that we at present possess, and when we devote ourselves with solicitous care to the maintenance of health and the prevention of disease and deformity among the rising generation, then, and only then, shall we stand acquitted of the insistent obligation that is ours, and be able to hold high our heads as a profession worthy the respect and admiration of the world. Toward this happy consummation, we commend the attention of every one of those to whose care children are committed, with the assurance and our most inspiring achievement."

**DEPARTMENT OF  
ORAL SURGERY, ORAL PATHOLOGY  
AND SURGICAL ORTHODONTIA**

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**HYPERPARATHYROIDISM ASSOCIATED WITH MULTIPLE GIANT  
CELL TUMORS OF THE JAW\***

JAMES BARRETT BROWN, M.D., F.A.C.S., ST. LOUIS, MO.

THE diagnosis and treatment of lesions and tumors about the mouth may require careful general physical and laboratory examinations. Although the mouth is perhaps the easiest area in the body to examine, some of its lesions necessitate the consideration of the patient as a whole, exactly the same as lesions in other specialized areas, and only when this attitude is adopted will the best interests of the patient and the profession be served. The case reported here of a patient with five giant cell tumors of the jaws associated with the laboratory findings of hyperparathyroidism and a tumor of the left parathyroid is taken as an example.

In the large volume of literature on bone tumors, osteomalacia and multiple bone cysts, there have been occasional cases reported as associated with tumors of or hypertrophy of the parathyroid glands. Erdheim (1903) thought that the gland enlargement was a compensatory hypertrophy secondary to the bone changes. DaCosta (1909) reported six cases from the literature and one of his own. Schlagenhaufer's (1915) recommendation for excision of palpable parathyroid tumors in a case of osteitis fibrosa was rejected by the surgeon in charge.

Mandl (1925), acting on Erdheim's theory did a homograft of parathyroid glands (from an accident victim) into a patient with generalized osteitis fibrosa, but the disease progressed. He then explored the parathyroid region and removed an adenoma of the gland, and there was steady improvement of the patient. Other patients were treated similarly by other observers.

Collip (1925) prepared an extract of the parathyroid gland, "parathormone," which would relieve parathyroid tetany when used with calcium lactate. Experimental and clinical observations with this extract laid down the basis for the present day conception of the physiology of this gland.

Barr, Bulger and Dixon (1929), on careful study of the reported cases and one of their own, described the clinical syndrome for cases of parathyroid hypertrophy or tumor formation under the name of hyperparathyroidism. Their original list of clinical features was, "(1) Rarefaction of bone; (2) the occurrence of multiple cystic bone tumors; (3) muscular weakness and hypotonia; (4) abnormal excretion of calcium in the urine and the forma-

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tion of calcium stones; (5) abnormally high serum calcium." There is also a decrease in the serum phosphates, and a negative calcium balance, that is, more calcium is excreted than is ingested. They state that hypercalcemia should always arouse the suspicion of hyperparathyroidism, and that it is the main diagnostic clinical sign.

With this syndrome to go on, there have been a good many more observations made and operations performed accordingly with many brilliant results reported. One surgeon was so sure of the presence of the syndrome that he operated on the neck without the presence of a palpable tumor and, when he found none on the first side, he proceeded to the opposite side, and there found a tumor.

#### CASE REPORT

A farmer, aged thirty-eight years, presented himself with a growth in the left maxilla of eight months' duration. There had been but little discomfort, some teeth had loosened and had been removed, and there was some hemorrhage. The general physical condition had remained good, he was working steadily and there were no other subjective symptoms.

On examination there was found a large tumor of the left maxilla. X-ray pictures showed this large tumor containing an unerupted tooth, and four smaller growths, one in the right maxilla, one in the body of the mandible on each side and one near the symphysis (Figs. 1, 2, 3, and 4). Wassermann test was negative.

A biopsy was done and the growth found to be a giant cell tumor (Fig. 5).

A radical operation was done and radium therapy given.

Two months later the remaining four areas were destroyed with the cautery and radium therapy given on the right side.

About this time the work of Barr, Bulger and Dixon was carried out on another patient with multiple giant cell bone tumors, and our attention was called to it.

This present patient had continued working without symptoms, but his color had gotten bad, and he was referred to Dr. Bulger. On admission to the hospital the red count was below 3,000,000. The differential count was normal.

Dr. Bulger found the serum calcium elevated to 16 to 18 mg., a low serum phosphorus, and a negative calcium balance, most of the excess calcium being put out in the urine. He found a definite tumor in the left parathyroid, and a diagnosis of hyperparathyroidism was made. There was no hypotonia, and no urinary symptoms were present. General x-ray pictures of the body did not show any other tumors.

Removal of parathyroid tumor was done through a low collar incision. A small piece was transplanted under the rectus muscle as a possible guard against the development of tetany. In a previous case of Barr, Bulger and Dixon's, operated on by Dr. I. Y. Olch, there had been severe tetany after removal of the tumor. Microscopic diagnosis was adenoma of the parathyroid (Fig. 6).

On the day of operation the serum calcium had been 14 mg.; in twenty hours after the operation it was down to 10.6 mg. On the sixth postoperative day it was 8.3 mg. There was no development of tetany; the patient rapidly recovered and was able to go about his work with no further trouble.

At the time of this operation it was considered that all the five tumors were already cured, but it was possible that some activity was present that was arrested by removing the parathyroid tumor.

In another similar instance, we would, of course, remove the parathyroid tumor before operating on the local lesions.

#### COMMENT

1. The mouth may frequently be the site of a lesion or symptom that is secondary to or dependent on some lesion elsewhere in the body.



Fig. 1.  
Fig. 2.

Fig. 1.—Left jaw film showing large tumor in maxilla containing an unerupted tooth, a large tumor toward the symphysis and a smaller one in the molar region.

Fig. 2.—Shows same areas as Fig. 1 after twenty months. There is no sign of activity on either x-ray examination or physical examination.

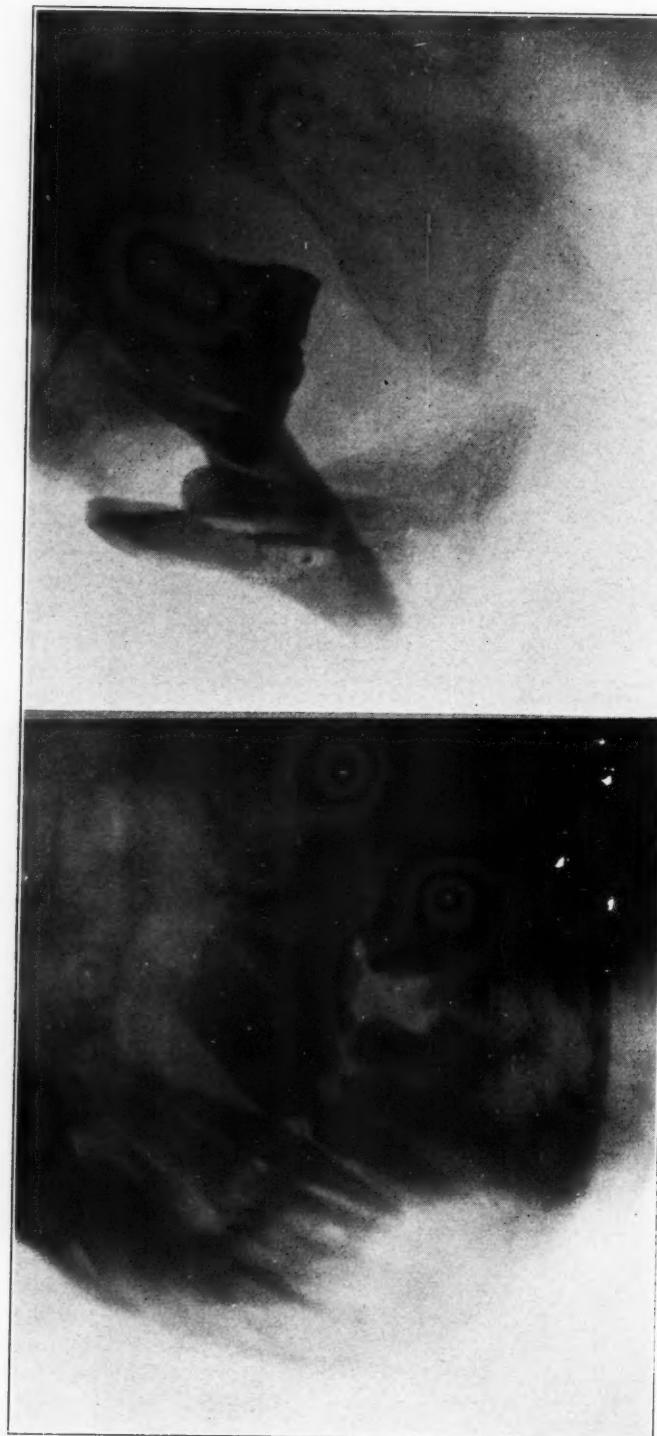


Fig. 3.  
Fig. 4.

Fig. 3.—Right law film showing the anterior involvement and the large area in the molar region.  
Fig. 4.—Same area as in Fig. 3 after twenty months. There is a pathologic fracture but no evidence of growth activity.

2. For lesions or tumors about the mouth that do not respond to ordinary treatment in a short time, further studies should be made of the patient, examining all systems and having adequate laboratory examinations made.
3. If one or more giant cell tumors are suspected, a biopsy should be done, or one tumor totally excised for examination.
4. If this proves to be a giant cell tumor or some type of osteitis fibrosa, a

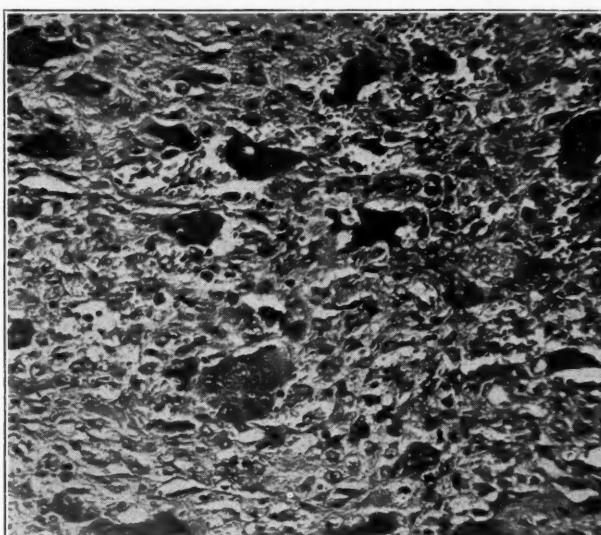


Fig. 5.—Photomicrograph of original biopsy showing immense number of giant cells present in the growth.

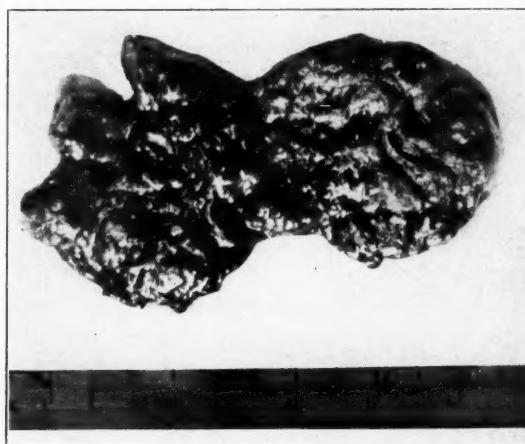


Fig. 6.—Adenoma of parathyroid split open to show solid character.

serum calcium determination should be done, and a careful examination of the parathyroid region made.

5. If there is the clinical syndrome of hyperparathyroidism and a palpable parathyroid tumor and giant cell tumor has been definitely diagnosed, any radical removal of jaw bone should be delayed until the hyperparathyroidism is treated either by medical means or by removal of the parathyroid enlargement, and sufficient time has elapsed to allow for retrogression of the jaw tumor.

6. In coming to the conclusion as to the diagnosis or treatment of any suspected hyperparathyroidism, the mistake should be avoided of delaying too long the treatment of any original lesion that might be malignant or otherwise independent of a parathyroid involvement.

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LESIONS OF THE ORAL CAVITY AND OF THE JAWS AND THE REGION OF THE JAWS, INCLUDING THE TEMPORAL FOSSA, ORBITAL CAVITY, AND SINUSES

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JOSEPH COLT BLOODGOOD, M.D., BALTIMORE, MD.

(Continued from page 644)

## LEUCOPLAKIA

FIG. 5 is the best illustration I have of the white patch which may form on the mucous membrane of the oral cavity.

With rare exceptions, leucoplakia is found only in the mouths of users of tobacco, as a rule in excess; in addition, the teeth are coated with deposits of dirty tartar. When the leucoplakia is observed on the tongue, the Wassermann blood reaction is positive far more often than usual—in my cases in more than 20 per cent.

Since 1924 I have observed four cases of leucoplakia in women when apparently we could exclude tobacco in all forms and all irritations except metallic fillings. Fig. 6 shows leucoplakia on the tongue in a woman; the Wassermann was negative.

Between 1911 and 1928 we have excised leucoplakia in only five instances. All of these patients were reported to be well in 1928. In four cases it was due to the usual causes—tobacco and teeth. In one instance the patient was a woman, and the lesion was similar to that shown in Fig. 6. When we changed to gold the fillings in the molars of the lower jaw opposite the white patch on the tongue, there was no apparent improvement, so the area was completely excised, and there has been no trouble in the scar since the operation three years ago. This last case gave me the opportunity to study microscopically leucoplakia in its pure stage, that is, not complicated by cracking, ulceration, warts or stomatitis with positive blood Wassermann. Fig. 7 and Fig. 8 picture

the different stages of the hypertrophy of the epidermis of the tongue, the seat of this pathologic condition. In Fig. 7 there is but slight thickening of the epidermis; in Fig. 8 there is not only marked thickening, but beginning down-growth. The morphology of the cells in leucoplakia shows distinct changes from the normal, best seen in Fig. 8, as compared with Fig. 7. In Fig. 7 the deeply staining layer of cells is much thicker than in Fig. 8.

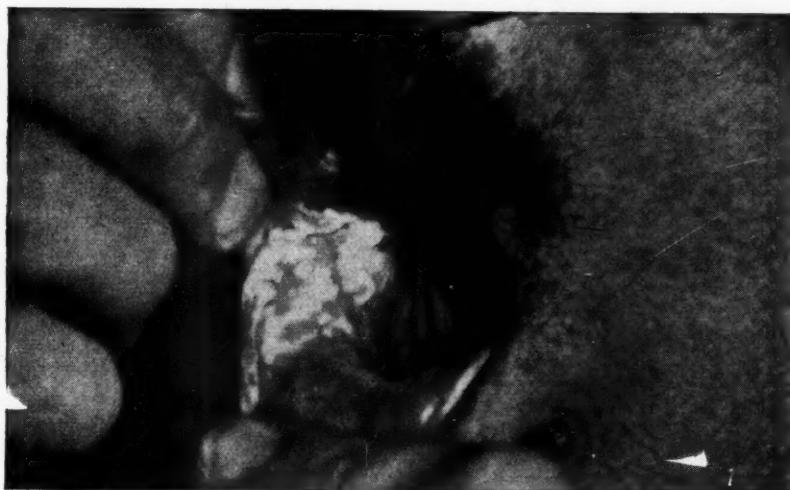


Fig. 5.—Pathol. No. 5112. Leucoplakia on the mucous membrane of the right cheek. Photograph taken in 1914. Patient well in 1929, fifteen years later. Factors—tobacco and ragged, dirty teeth; Wassermann positive. White patches observed two years.



Fig. 6.—Pathol. No. 35574. Photograph taken in 1924. Adult woman; denies tobacco in all forms; only possible factors were coffee in excess and rough metallic fillings on molar teeth. Both factors removed. In 1929, five years later, the patient is well.

#### ETIOLOGIC FACTORS

The records in the laboratory show that previous to 1911 we observed leucoplakia only when there was cancer of the mouth, and we could see the microscopic picture of this benign hypertrophy when sections were made through the mucous membrane at the edge of the cancer. Since 1911 examples of leucoplakia before the stage of cracking, ulceration, warts or cancer have steadily increased. In the first ten years, from 1911 to 1920, there were only seventeen

cases, while since 1920 there are more than fifty cases. With a few exceptions already noted, these patients are users of tobacco in some form, usually in excess. I have a chart before me now in which the factors tobacco, teeth and syphilis are noted in every instance. With the exception of five cases in women, tobacco is noted in every instance; teeth are noted in fully 90 per cent. When the lesion was on the tongue, a positive Wassermann was found in 13 per cent of the cases. When the white patches were on the mucous membrane



Fig. 7.—Pathol. No. 37332. Low-power photomicrograph of edge of patch shown in Fig. 6 of leucoplakia on tongue. Factors—tobacco and syphilis—absent.

other than that of the tongue, the Wassermann was positive in about 3 per cent. The duration of leucoplakia without the development of cancer is usually less than five years, in the majority of cases less than two years. In only one instance was the leucoplakia present without any evidence of cancer for a period of twenty years. In this case the Wassermann was negative and the factors were both bad teeth and tobacco. This patient was cured when he stopped smoking and kept his teeth clean for a period of now seven years.

It is important to note here that up to the present time we have never observed cancer to develop in a patch of leucoplakia except when the patient

admitted using tobacco in excess and when the teeth were neglected, ragged and dirty.

The microscopic study, as shown in Figs. 7 and 8, demonstrates that leucoplakia is, for practical purposes, a hypertrophy of the epidermis, just as a corn, a callosity, a wart or a papilloma is. These various types of hypertrophy of the skin and mucous membrane are apparently due to some form of chronic irritation. If we are correct that cancer never begins as cancer, but begins in



Fig. 8.—Pathol. No. 37332. Section through a thick patch of leucoplakia on tongue in Fig. 6. Note the hypertrophy and downgrowth of the epidermis. The cells of the superficial layers show morphology changed from normal. Area excised in 1925; the patient is well in 1929.

a lesion that is not cancer, and the lesion that is not cancer is first composed of an area of cells which have multiplied far beyond the normal needs due to some form of chronic irritation, then leukoplakia of the mouth must be classed with precancerous lesions. Leucoplakia differs from the ordinary corn on the toes in the fact that it is the chief cause of cancer of the mouth, as accurate observers for years have concluded. The irritation of tobacco and bad teeth first causes the leucoplakia. The continued irritation by the same factors causes

the development of cancer. I am of the opinion that this continuous study of cancer of the mucous membrane of the oral cavity in the past twenty-seven years has brought out even more convincingly than experimental work on animals the factor of chronic irritation in the production of cancer and the conclusion that the local irritation—no matter what it is—produces a local lesion first which is not cancer. This leads to the natural conclusion, confirmed by clinical experience, that if human beings are correctly informed and remove the factors tobacco and bad teeth very quickly after patches of leucoplakia are observed, cancer will be prevented in every instance.

#### CLINICAL TYPES

Figs. 5 and 6 are exaggerated cases, but they correctly picture the white patch. This patch of leucoplakia may appear as a white dot, an irregular macula, or as a streak, often with branches like a dried twig. The area always



Fig. 9.—Pathol. No. 35842. Wart in area of leucoplakia on the tongue. Complete excision in 1924. Well in 1929. Microscope revealed early cancer.

feels different from the mucous membrane about it—a little indurated like a piece of leather. It is always white. It has lost its vascularity and is never moist like the normal mucous membrane. Unless a distinct wart has developed, it is never very thick. It is rarely painful or tender. The most common situation is where the tongue, lips or cheek come in contact with the teeth. Often the teeth make branching ridges on the cheek by pressure. Leucoplakia develops in lines on the summit of these little ridges, and in any one of these lines a larger patch may develop. The larger patches are most common on the sides of the tongue and at the angles of the mouth. Leucoplakia is less frequent on the gum, but, when present, is usually situated in the defect of an extracted tooth. I have never seen leucoplakia in the tonsil or pharyngeal region. It is not so frequent on the hard and soft palate. When there are both tobacco and pressure from plates, it may occur on the hard palate. Now and then we see it on the uvula.

## TREATMENT

When leucoplakia has the appearance shown in Figs. 5 and 6, and there is no evidence of cracking, peeling, ulceration, wart or papilloma, or unusual induration, or no marked pain or tenderness, there is no indication for its removal, nor the employment of any irritants, nor of x-rays or radium. My personal experience since 1911—eighteen years—with an increasing number of cases has shown that the removal of tobacco in all forms, cleansing of the teeth and the proper and efficient care of all lesions of the teeth will quickly and uniformly accomplish a cure and these patients will remain well. Those who have gone back to tobacco and neglected their teeth as a rule observe recurrence of the leucoplakia and then its disappearance when the treatment is resumed. In a few cases, unfortunately, cancer has developed and some of these have been cured by prompt operation.

It is always to be borne in mind, especially when the leucoplakia is on the tongue, that the Wassermann may be positive and the patient must also receive intravenous specific treatment. In other cases, in addition to the leucoplakia, there are stomatitis, gingivitis, pyorrhea, and even a general diffuse inflammation of the oral cavity dependent upon unrecognized or neglected root abscesses, Riggs's disease, infected tonsils or sinuses. In a few instances there may be pellagra, diabetes, achylia. For this reason leucoplakia, Vincent's angina and all other similar lesions of the mucous membrane of the mouth require a complete diagnostic survey with the proper treatment of all positive findings. The failure to cure completely all cases of leucoplakia and all cases of trench mouth can usually be explained by the failure to demonstrate and remove an additional and concealed factor.

*Operative Treatment.*—In a very few instances, as illustrated in Figs. 7 and 8, when the white patch fails to disappear and it worries the patient, the area can be excised with the knife, electric cautery or diathermy needle and the wound closed if possible. In my experience it always can be.

The indications for excision of leucoplakia are distinctly visible changes in the white patches. Cracking is the very earliest sign of a change toward malignancy. Distinct ulceration, even when only superficial, is not always associated with definite malignancy, but more frequently it is. The development of a wart, similar to cracking and ulceration, is an urgent sign for immediate removal of the area. When cracking, ulceration or a wart are present, there should be no delay except perhaps for cleansing the teeth and extracting those with root abscesses. Even when the Wassermann is positive, I think it wiser to excise the area. Although I have a few examples of superficial ulceration in an area of leucoplakia with positive blood Wassermann which have healed under intravenous treatment in association with other measures, more often patients have lost their lives because of *too long a delay* with antiluetic measures.

When one excises a patch of leucoplakia because of cracking, ulceration or the presence of a wart, the area should be removed with a good margin of uninvolved tissue as if it were malignant. I have numerous examples of all three types showing that there is no way of distinguishing the benign from the malignant except under the microscope.

Fig. 9 pictures a definite wart which has developed in an area of leucoplakia on the tongue. After its excision early cancer was found in the sections.

#### CONCLUSIONS

As the early stage of leucoplakia is not painful, often invisible, the time should quickly come when the dentist not only should be the first to observe the leucoplakia but should warn his patient that tobacco in all forms should temporarily be discontinued.

When adults are under the care of dentists, they should see them frequently. When the teeth are kept clean and smooth, and plates which cause any irritation are immediately removed or repaired, tobacco in moderation will rarely produce leucoplakia except in a very few individuals who are very sensitive to this irritation.

As bad teeth and tobacco are the chief causes of cancer of the mouth, this disease, which causes more than four thousand annual deaths in the United States, should be gradually and almost completely eliminated by education of the public, the medical and dental professions.

#### APPENDIX

The only correction I have made is of a mistake which crept into the original article in the *System of Surgery*. It stated that in 20 per cent of the cases the Wassermann reaction was found to be positive in lesions of the tongue, while in only 1 per cent was it positive in lesions of the oral cavity outside the tongue. I have looked up my original notes which were made in 1924, and the correct figures are: Wassermann plus in lesions of the tongue 13 per cent, benign or malignant; in lesions of the oral cavity other than of the tongue 3 per cent. Butlin, the great authority on cancer of the tongue in London who wrote some thirty-five years ago, called attention to the common occurrence of cancer of the tongue in people giving a history of syphilis. I think I can explain this. In patients with lues there is frequently stomatitis and fissured tongue. If in addition to this there are ragged, dirty teeth and tobacco, the chronic irritation of these two factors is more liable to produce cancer in a tongue the seat of glossitis. This benign lesion of the tongue which often accompanies syphilis is becoming less frequent, but I wish to repeat here that it is a very dangerous thing if the Wassermann is plus, to depend too much on the therapeutic test, and, in addition, even if the lesion of the tongue when the Wassermann is plus seems to improve under intravenous treatment, it is much safer to do a biopsy. Every day of delay is dangerous. Patients with cancer of the tongue and syphilis, in the past, show a smaller percentage of five-year cures, no matter what the treatment has been.

The patient whose leucoplakia of the cheek is shown in Fig. 5 also had a fissured tongue the seat of glossitis, and a positive Wassermann reaction. It is more than fifteen years since this picture was taken. The leucoplakia has disappeared. The patient who had a patch of leucoplakia on the tongue as shown in Fig. 6 is well today (June, 1932), more than ten years since operation.

I have no corrections of any statements made in this article written some three or four years ago, except the knowledge that leucoplakia is observed

chiefly in the mouths of those who use tobacco in any form and who, in addition, have ragged, dirty teeth, and the only treatment for this leucoplakia is to discontinue tobacco and to keep the teeth clean and smooth. I find that the majority of dentists now look for leucoplakia whenever they examine the mouth. The majority of patients who enter the clinic today with leucoplakia have had their teeth cleaned and have been advised by a dentist to give up tobacco. In spite of the fact that more women are smoking than ever before, we do not see leucoplakia or cancer in women of the modern type who keep their teeth clean. Since writing this article I have three more cases of leucoplakia similar to the one illustrated in Fig. 6 in women who did not use tobacco and in whom the cause apparently was the irritation by a tooth. In two cases, the white patch disappeared after extraction of the tooth, in one it did not. For this reason the area of leucoplakia was excised under novocaine, and the sections resembled the picture shown in Fig. 8. During my recent visit to London where I saw a great many cancer patients in tumor clinics, it seemed to me that I saw more cancer of the tongue in women among the same number of cancer patients. These women with cancer of the tongue belong to the group who did not use tobacco, but who could not afford to have their teeth kept in order. The same group of women in this country who do not use tobacco seem to be under the care of a dentist, so they rarely get cancer.

My observations, which have been carefully checked, emphatically indicate that those people under the care of a good dentist trained to observe the entire mouth run very little risk of cancer of the oral cavity, just as mothers who are under the observation of obstetricians or general practitioners who insist upon pelvic examinations at proper intervals, run very little risk of cancer of the cervix.

If the white patch of leucoplakia shows no evidence of malignancy and is associated with tobacco and ragged, dirty teeth, it is a mistake to do more than clean the teeth and persuade the patient to give up tobacco in all forms. To excise one of the areas or the only area or to treat it with radium is illogical, because leucoplakia, even when there is only one patch, is an expression of a general disease of the mouth, and the important thing is to remove the two causes—ragged, dirty teeth and tobacco. If tobacco is not one of the causes, then one must find and remove the cause in the teeth or in plates. If the area of leucoplakia, then, does not disappear, no matter how benign its appearance, it must be treated with radium by one who understands the application of this dangerous salt, or the area should be properly excised.

*(To be continued)*

## STREPTOCOCCIC STOMATITIS

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**S**TREPTOCOCCIC stomatitis is a stomatitis caused by streptococcal infection and characterized by evidence of acute or chronic infection. It is not generally recognized, and it is a particular type of disease differing from any of the other types of stomatitis described in our textbooks or in the literature. I have seen a number of instances where typical cases of this disease have been diagnosed as ulceromembranous stomatitis (Vincent's) by both the medical and the dental professions. The cases I have been able to differentiate have occurred as a gingivitis.

*Etiology.*—This type of stomatitis may follow a streptococcal sore throat or severe cold but may also occur as a result of poor mouth hygiene in a patient with a lowered resistance, particularly a patient with a diet deficiency. It may follow a tooth infection, especially where there has been an acute flare-up.

*Symptoms.*—This disease usually starts with a gingivitis around two or more teeth and may spread around the entire ridge and involve all of the maxillary and mandibular teeth. In the more severe acute type of cases the gingivae are hypertrophied, congested, bleed easily, and are painful. Ulceration does not accompany these symptoms, although I have observed some cases where ulceration or Vincent's infection was superimposed upon the streptococcal stomatitis. In the milder or chronic cases the gums remain a cherry red color, bleed easily, and are tender.

*Pathology.*—This is an inflammation caused by the invasion of the streptococcal organisms. Smears taken from the crest of the gingiva show the presence of green hemolytic streptococcus or *Streptococcus viridans* predominating, with staphylococci and other mouth organisms.

*Diagnosis.*—The diagnosis of this type of stomatitis is somewhat difficult, as it requires a wide clinical experience in order to differentiate it from the other types of stomatitis. The history of a sore throat or a cold in the presence of the definite picture of this disease is very significant. Smears taken from the gingival crest will show the type of organisms. The differential diagnosis is usually between this disease and ulceromembranous gingivitis (Vincent's). I have observed a number of cases in which this true picture of streptococcal stomatitis was present and in which there was a definite assurance on the part of those caring for the disease that they were dealing with an ulceromembranous gingivitis (Vincent's). The physician is very likely to jump to the conclusion that he has a clinical Vincent's infection if he is able to obtain the fusiform bacilli and spirochetes in a smear taken from the mouth. In some of these cases I have observed a mistaken diagnosis of Vincent's infection where only a few of the fusiform bacilli and Vincent's spirochetes were found and where the clinical symptoms were definite for streptococcal stomatitis and where cultures showed a great number of colonies of streptococci.

**Prognosis.**—The prognosis is usually very favorable where the correct diagnosis is made and where the correct treatment is given. In those cases in which the diagnosis is not correct these infections may cause a great deal of discomfort and often very serious complications. In any event they may resist treatment for great periods of time in a chronic stage.

**Treatment.**—The treatment is both local and general. The local treatment consists of frequent irrigation of the gingival tissues and the mouth with warm solutions of salt, soda and peroxide, the use of metaphen, mercurophen or mercurochrome. The tissues should be swabbed freely with metaphen solution.

The following dyes are recommended:

Acriviolet	1%
Neutro-acriflavine	1: 1,000
Mercurochrome	5%

Metaphen in a 1:500 or 1:1000 solution or the tincture of metaphen may be used.

The drug may be put beneath the gingival margin of the gum by the Vastine cup method or by the use of a syringe or a platinum loop such as is used for culture work.

The patient's general condition should receive careful consideration. He should have a full physical examination and any irregularities corrected. The physical examination should consider the blood picture, urinalysis for sugar and albumin as well as calcium and phosphorus metabolism. Particular attention should be paid to the diet, giving at least thirty ounces of orange juice daily, plenty of green vegetables and fruits, with a minimum of meats and sugars. After the acute stage has subsided and the stomatitis is under control, search should be made for the primary factors, and diseased tonsils or any factor tending to cause an acute flare-up of the mouth or throat should be removed.

#### CASE REPORTS

**CASE 1.**—Miss J. W., student, aged sixteen years, came for treatment with the gums hypertrophied throughout the entire mouth. The gingivae were swollen, congested, painful, and bled easily.

**History.**—The patient complained of painful gums, lack of appetite, headache, and feeling of general malaise. Her temperature was 101° F. Her history showed that one week previously she had an acute pharyngitis, and her gums became sore immediately afterward and still remained sore after throat symptoms had cleared up.

**Examination.**—Full roentgenographic study of her teeth showed one cavity, but there was no evidence of periapical or periodontal pathologic change. There were four impacted teeth but no definite pockets or evidence of gingival irritation.

The following is the bacteriologic report received from the laboratory:

<i>Material:</i>	Cultures and smears from mouth.
<i>Special media:</i>	Placenta infusion agar and human blood agar plates.
<i>Bacteriologic diagnosis:</i>	Direct Smears: Many pus cells; few Vincent's spirilla and fusiform bacilli; few ameba gingivalis; many staphylococci and streptococci.
<i>Culture:</i>	<i>Streptococcus viridans</i> <i>Staphylococcus aureus.</i>

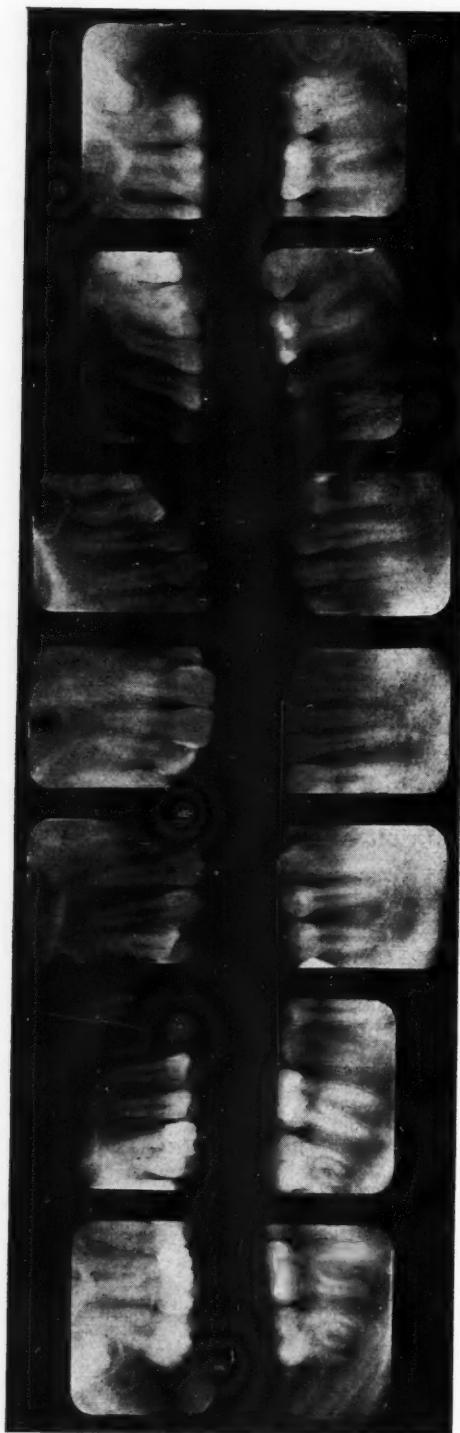


Fig. 1.—Case of Miss J. W., streptococcal stomatitis, showing roentgenograms of all teeth.

The following is the report of urinalysis:

*Physical and*

*Chemical Examination*

Quantity:  
Color: Cloudy amber  
Specific Gravity: 1.037  
Reaction: Acid  
Albumin: Faint trace  
Sugar: Negative  
Acetone: Negative  
Diacetic acid: Negative

*Centrifuged*

*Microscopic Examination*

Casts: Negative  
Red cells: Negative  
White cells: Few  
Pus: Negative  
Epithelial cells: Many squamous, few round  
Crystals: Negative  
Amorphous material: Few urates  
Cylindroids: Many mucous cylinders

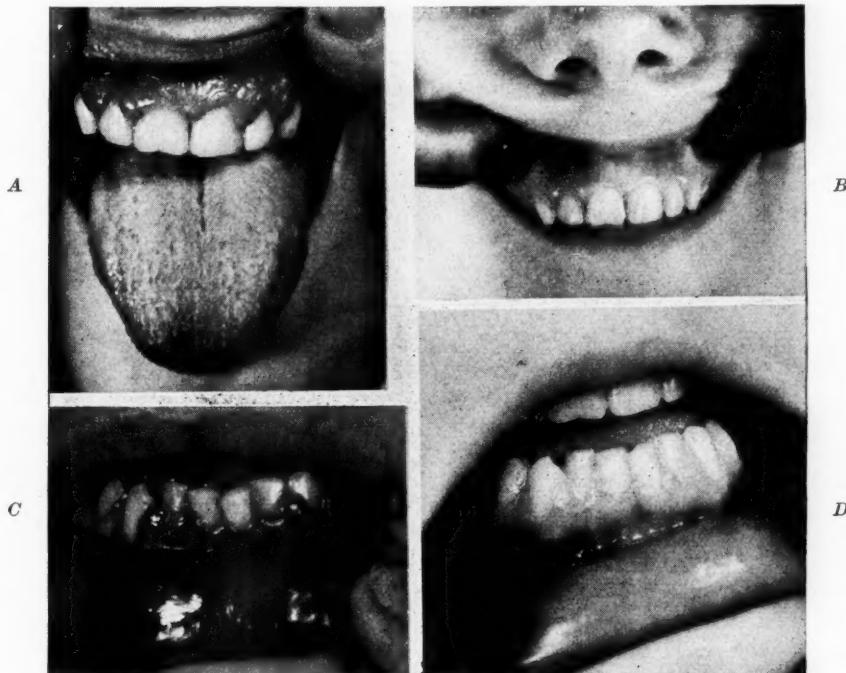


Fig. 2.—Case of Miss J. W., streptococcic stomatitis. *A*, Photograph of maxillary gums before treatment; *B*, photograph of maxillary gums after treatment; *C*, photograph of mandibular gums before treatment; *D*, photograph of mandibular gums after treatment.

**Remarks.**—Faint trace of albumin, indicative of toxic irritation of kidney, suggests possible focal infection.

The following is the report of the blood examination:

Red cell count	4,200,000
White cell count	8,400
Hemoglobin (Dare)	78%
Coagulation time	3 minutes
Differential count:	
Polymorphonuclears	71%
Lymphocytes (large and small)	26%
Mononuclears and Transitionals	2%
Eosinophiles	1%

**Condition of Red Cells:** Some anisocytosis and eccentric achromia; few cells show microcytic and poikilocytic tendency; no polychromatophilia, basophilic stippling, nucleated red cells, or other abnormal elements present.

**Diagnosis.**—A diagnosis of streptococcic stomatitis was made.

**Treatment.**—The gingival areas were irrigated every two hours with 1:1,000 metaphen solution. The gingival tissues were treated with tincture of metaphen by the Vastine cup method. The gums were painted with methylene blue powder. Patient was given four ounces of magnesium citrate and her diet corrected by advising her to eat plenty of fruits and vegetables with very little meat and sweets. She was given at least thirty ounces of orange juice daily. The gums improved but a course of treatments for two weeks was necessary before there was complete relief of the disturbing symptoms. She has not had a recurrence of the disease in six months.

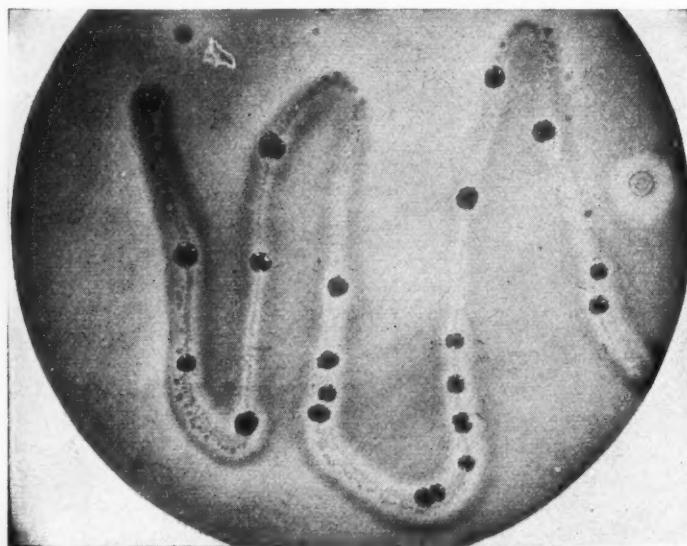


Fig. 3.—Photograph showing growth of streptococci obtained from case shown in Figs. 1 and 2.

**CASE 2.**—Mr. H. D. MeR., aged twenty-three years, a clerk, was referred to me with a gingivitis, which had been treated for ten days by his dentist without result. A smear had shown fusiform bacilli and Vincent's spirochetes, a diagnosis of Vincent's infection had been made, and treatment instituted for Vincent's infection, using sodium perborate mouth wash and 2 per cent mercuriochrome.

The clinical picture did not show a necrotic or ulcerative lesion but showed a definite red inflamed gingiva with very slight hypertrophy.

The following is the laboratory report:

**"Problem."**—Patient has had an acute condition of the mouth which was resistant to treatment, with associated constipation.

"History showed an attack of acute streptococccic sore throat four days previous to presenting for treatment for present trouble.

**"Examination."**—General bite and occlusion play no part in present trouble. Whole mouth is reddened and there is an excess of saliva. Teeth are large and clean. Gingivae are boggy, especially on the margins, with slight bleeding and no sulci or pockets except around irregular dental formations.

"The lower frontal buccal area has a local necrosis with false membrane. Microscopically this appears to be mostly desquamated cells with myriads of cocci and spirilliform types.

"The sulcal smears show some exudate with a mixed bacterial flora but no spirilliform organisms. (Rules out trench mouth.)

"Smear, fresh:

Borrelia	Not demonstrable
Fusiform bac.	1+
Endameba	1+
Vibrio	1+

“*Diagnosis*.—Acute necrotic and exudative stomatitis.

“*Culture*.—Pure culture of green hemolytic streptococcus.

“*Chemotherapy*.—

Mercurochrome	1: 5,000	No growth
Aeriflavine	1:10,000	No growth
Aeriviolet	1:10,000	No growth
S. T. 37	1: 8,000	Growth
Argyrol	1: 5,000	No growth
Mercurophen	1:10,000	No growth
Metaphen	1:10,000	No growth
Germicide	1: 1,000	Growth
Phenol	1: 1,000	Retarded
Triresol	1: 1,000	Retarded”

*Treatment*.—A soapy tooth paste was prescribed, and the patient instructed to use a saline mouth wash every two hours. The gingival tissues were treated with metaphen solution, 1:500, by the Vastine cup method twice daily.

Response to treatment was prompt and the symptoms entirely disappeared in ten days. The tonsils had large erypts filled with infection. They were removed to eliminate the toxic factor. The mouth symptoms have not recurred in fourteen months.

**CASE 3.**—Miss H. W. came to me for treatment of gums May 6, 1931. The gums showed a red gingival border and bled easily.

The following is a report from her physician:

“*Personal History*.—Patient has no particular complaints but has been told that her gums are in an unhealthy condition, and she desires a general physical examination. She states that she has no pain or discomfort. Appetite good. Bowels regular. There has been no change in weight in the past year. Her menstrual periods are regular.

“*Occupation*.—Teaches piano. She finds this work congenial and not too taxing. She gets a reasonable amount of recreation and exercises by walking approximately one mile daily.

“*Dietary*.—Her dietary is a bit restricted and she could easily gain a few pounds to advantage.

“*Past Health*.—She has had measles, mumps, and whooping cough in childhood. Tonsils were removed at the age of thirteen. Her general health has been excellent.

“*Physical Examination*.—

“*Sinuses*: Frontal sinuses transilluminate well. The maxillary sinus shows slight cloudiness on the left side.

“*Tonsils*: Removed at the age of thirteen. There is a slight amount of tonsillar tissue remaining on the left side which does not appear to be infected. Posterior pharynx is slightly congested.

“*Teeth*: Teeth show evidence of considerable dental work. The mandibular left third molar is badly decayed and not in very good position. The gums about most of the teeth are spongy, show evidence of gingivitis and bleed easily. The teeth transilluminate well.

“*Nose*: Breathing space is good on both sides.

“*Ears*: Drums and external canals appear normal.

“*Glands*: Lymphatic glands, not enlarged. Thyroid, normal in size; both lobes symmetrical.

“*Abdomen*: Soft. No masses palpable. No tender areas. Liver is normal in size. Spleen is not palpable. No tenderness over kidney region on either side.

“*Chest*: Expands freely and equally on both sides. Resonance is good. Except for occasional scattered râles, the chest is clear. There is no evidence of active pulmonary pathology.

“*Heart*: The rate is 96. The rhythm is normal. There is a soft systolic blow at the base, which is considered to be functional. There is no evidence of valvular heart disease.

“*Blood Pressure*: 134/76.

“*Reflexes*: Normal.

Fig. 4.

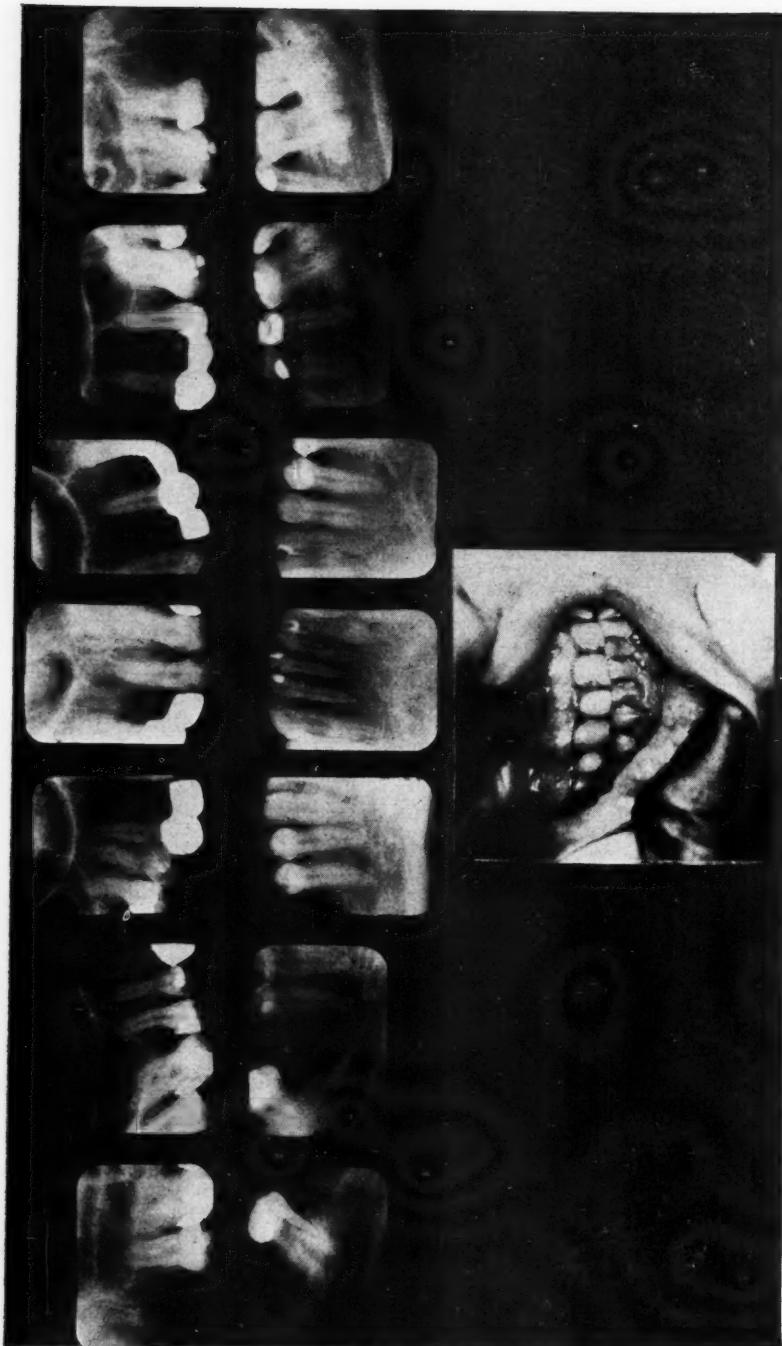


Fig. 5.

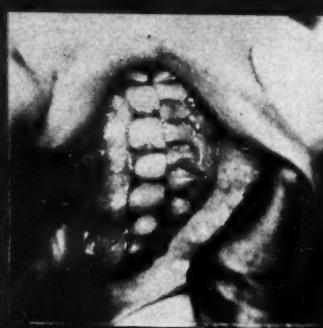


Fig. 4.—Case of Miss W., streptococic stomatitis. Roentgenograms of all the teeth.  
Fig. 5.—Case of Miss W., streptococic stomatitis. Photograph of gums before treatment.

## "Laboratory Data.—

	Blood Chemistry	Normals
Nonprotein nitrogen	(mg. per 100 e.e.) 32 mg.	( 28 to 38)
Urea nitrogen	(mg. per 100 e.e.) 14 mg.	( 12 to 15)
Uric acid	(mg. per 100 e.e.) 2.8 mg.	( 2.5 to 5)
Sugar	(mg. per 100 e.e.) 108 mg.	( 90 to 115)
Chlorides	(mg. per 100 e.e.) 460 mg.	(410 to 510)

"Smears From Gums: Smears from gums show numerous pus cells, many epithelial cells; considerable mucus; Vincent's spirilla and fusiform bacilli.

## "Blood Picture:

Red blood cells	4,110,000
White blood cells	11,800
Hemoglobin	78%
Neutrophiles:	
Juveniles	1%
Band forms	2
Segmented	70
Lymphocytes	26
Monocytes	1

## "Urinalysis:

Appearance: Pale clear amber.  
 Reaction: Acid—6.0.  
 Specific gravity: 1.009.  
 Albumin: Negative.  
 Sugar: Negative.  
 Casts: Negative.  
 Cylindroids: Few.  
 Mucus: Some.  
 Leucocytes: Few.  
 Erythrocytes: Negative.  
 Epithelial cells: Few squamous and round.  
 Phosphorus: Trace.  
 Calcium: 0.07 mg. per 100 e.e.

## "Findings and Recommendations.—

"1. The clinical examination and laboratory data indicate Vincent's infection about teeth. It is recommended that this infection have appropriate dental treatment.

"2. The patient's dietary is a bit restricted and she has been instructed regarding increasing the caloric and vitamin content of her dietary.

"3. Patient consumes only about two glasses of water daily and she has been advised to increase this to from six to eight glasses.

"4. A tonic, in the form of tincture of Nux Vomica, minim 10, before each meal, was given."

On July 3, 1931, a culture from the gums was taken after the patient was sent back for culture and the following is the additional report:

"Blood agar plates and cultures show:

"Upper gum: Almost a pure culture of *Streptococcus viridans* with a few colonies of *Staphylococcus albus*.

"Lower gum: *Streptococcus viridans* in pure culture."

Final Diagnosis.—Streptococccic stomatitis.

Treatment.—The gingival areas were treated twice daily for one week and daily for two more weeks with 1:500 metaphen by the Vastine cup method. The gingival areas were sprayed with a solution of liquor antisepticus and peroxide. Her gums were painted with 10 per cent solution of mercurochrome.

She was instructed to use a mouth wash of 1:1,000 metaphen every two hours and was given a soapy tooth paste. Her diet was corrected, adding thirty ounces of orange juice daily, and plenty of fruits. She was restricted in her use of meats and sweets.

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## PREOPERATIVE AND POSTOPERATIVE CARE OF THE PATIENT PRESENTING FOR ORAL SURGERY

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THE examination of the patient consists of (1) a general examination and (2) a local examination. Before the examination takes place the assistant obtains the following information from the patient: his name, address, age, and occupation.

*General Examination.*—It is not necessary to make a complete physical examination of every patient; however, there are a few points which should be observed which will act as a guide to the operator. These are: (1) color of the skin, whether pale, florid, etc.; (2) pupils; (3) demeanor; (4) respiration; (5) breath; (6) pulse; (7) blood pressure.

Pallor of the face may indicate anemia or weak heart action. A florid complexion may indicate high blood pressure, while whiteness or chalkiness of the skin is often seen in cases of nephritis. A golden yellow hue is indicative of jaundice, especially if the cornea is yellow. Cyanosis is seen in cases of heart disease and pulmonary disturbances. In some cases blueness may be caused by overdoses of some drug, such as acetanilid or antipyrine, which reduces the hemoglobin. These drugs are often used by the patient to relieve pain before he consults the dentist.

A staring, unmoving pupil (Argyll-Robertson pupil) together with a shuffling, incoordinate gait is often indicative of locomotor ataxia. Bulging eyes might indicate exophthalmic goiter.

The demeanor is an excellent guide as to whether the patient needs pre-operative care or not. A highly nervous patient should be given some sedative. One that seems dull and lethargic and answers questions only when asked and then in monosyllables must be carefully watched. The patient may be upon the verge of shock due to fright, and, if this is the case, the operation should be postponed for the time being.

Difficulty in breathing may be due to heart failure and lack of nutrition of the respiratory center. Heavy, wheezing, labored breathing is often seen in the asthmatic patient.

Pulse is probably the most important thing to observe. A feeble, rapid pulse may indicate dilatation of the heart or myocardial degeneration. A rapid pulse may be due to absorption of toxins and is indicative of an active infection. In the latter case it is well to take the temperature. A short, sharp pulse may indicate aortic regurgitation. The intermittent pulse or one that misses may indicate great ventricular fatigue; this is seen in high blood pressure.

A radial artery that is difficult to compress and that can be rolled about under the fingers indicates hardening of the arteries, especially if the vessels about the temples are prominent. In these cases systolic pressure should be taken.

The odor of the breath may often inform us of some organic disease that may make the extraction of teeth dangerous. In diabetes, for instance, the breath has a peculiar sweetish odor. The smell of acetone is a dangerous indication. In cases of pus and necrosis, the breath has a distinctive fetid odor.

*Local Examination.*—The local examination is divided into: (1) physical, (2) radiographic.

The physical examination consists of inspection of the oral cavity, tooth and surrounding tissues, including palpation for enlarged lymph nodes.

Swellings should be palpated to see whether there is any fluctuation, or whether they are solid or due to cysts. In large cysts, there is a distinct cracking of the tissues on pressure, due to thinning of the alveolar walls.

The condition and the color of the gums and oral mucous membrane must be observed. If there is pallor of the mucous membrane, we should be on the lookout for anemia or some circulatory deficiency. Turgid, congested gums and oral mucosa may indicate valvular disease of the heart, especially of the valves of the right side of the heart, where the return flow of blood is interfered with.

Suppurative periodontoclasia, Vincent's infection, and mucous patches should be watched for. When the mouth is particularly dirty and there is much pus exuding from the necks of the teeth, unless the extraction is imperative it should be deferred until the mouth has been cleaned. In Vincent's infection, no extractions are to be made until the disease is cleared up. If mucous patches are suspected a Wassermann test should be made and proper treatment started. The thickness of the alveolar plates should be determined in order to judge where the force of extraction is to be applied. Do not let a loose tooth fool you. The crown may be fractured, or the tooth may be the seat of some diseased condition, such as carcinoma, necrosis, or a cyst, and is loose because of the loss of its bony support. Enlarged lymph nodes are indicative of some active infection. Where there is a solid tumor mass in the mouth, and the lymph nodes in anatomic relationship are enlarged, malignancy is to be suspected. Transillumination and the pulp test should be used. In the radiographic examination, to be safe every tooth should be radiographed. This will show the shape, number and position of the roots, whether exostosis exists or whether any pathologic condition is present. In many cases extraoral x-ray pictures are necessary.

#### PREOPERATIVE CARE

This is determined by the examination. The majority of patients will not need preoperative care, but we must be on the watch for those for whom it is indicated. If the patient is highly nervous, the triple bromides, one tablet dissolved in one-half glass of water should be given fifteen minutes before the operation. I have also found sodium amytal compound very helpful.

When examination reveals high blood pressure, the amount of adrenalin in the anesthetic solution is lowered. If the pressure is unduly high, the operation should be deferred.

Diabetic patients should be sugar free before they are operated upon. In known cases of severe heart disease one should try to establish compensation of the heart muscle. In cases of high blood pressure in which the operation must be performed, the adrenalin should be lowered or left out and the patient given a tablet of nitroglycerine, 0.01 gr., to be dissolved on the tongue. In cardiac disease the heart can be stimulated enough to proceed with the operation by administration of tincture of digitalis, 10 drops in a little water (digifoline 1.1 c.c.), or strychnine sulphate 1/60 gr. hypodermically or a tablet dissolved on the tongue. In all events, the operator should be calm and self-reliant, and the patient should be treated with the utmost kindness and assurance.

Preparation of the field of operation. We use a specific for each organism entering into the infection, as follows:

1. Mercurochrome 5 per cent—streptococcus,
2. Arsphenamine in glycerine 5 per cent—Vineent's infection,
3. Gentian violet and acriflavine 2 per cent—staphylococcus.

Some local accidents that might occur during the operation should always be borne in mind: fracture of the tooth; loosening of the adjacent tooth; fracture of the alveolus; fracture of the tuberosity; opening of the antrum; forcing tooth into the antrum; dislocation of jaw; fracture of jaw; and injury to the inferior dental nerve.

*General Complications.*—For syncope, treatment is to lower the patient's head and give him inhalations of ammonia and amyl nitrite. For cardiac failure, 10 per cent camphor in oil, 10 minims hypodermically, or caffeine and sodium benzoate  $\frac{1}{2}$  to 1 grain hypodermically or 1 ampule of coramine (Ciba) can be given with good results.

#### POSTOPERATIVE CARE

Postoperative care is as important as the operation itself. Aftercare can be divided into: (1) care taken by the operator, (2) care taken by the patient at home.

The patient should always be advised to return once for observation after an extraction. If the wound is healing, the patient is dismissed with the admonition to return if any trouble arises.

Some sockets heal slowly and sluggishly. There may or may not be pain. The cause may be local, such as low grade infection of the tissues, or general, due to an alteration of the chemistry of the blood, as in diabetes, syphilis and tuberculosis. Locally, the socket can be lightly curetted to encourage bleeding and cauterized with a 10 per cent  $\text{AgNO}_3$  to stimulate granulation. Dentalone with gauze dressing is excellent. Dakin solution is useful for irrigation. For painful sockets procaine hydrochloride and balsam of Peru can be used. Mixed stock vaccines have been used with good results. In cases in which a flap has been sutured, the condition of the circulation of the flap must be watched. If it looks red and congested, the circulation is aided by gentle massage and applications of warm isotonic solutions, held in the mouth. In cases of normal healing, sutures (silk No. 00 or dermal) are removed in four or five days.

*Aftercare Taken by the Patient.*—For relief of pain, the salicylates and the antipyretic group act as sedatives and anodynes. Aspirin is very helpful, 2 to 5

grain tablets every three hours with plenty of water, also acetanilid, acetphenetidin, and antipyrin, amidopyrin (pyramidon). In some cases codeine sulphate can be added. If there is a tendency to upset digestion, a teaspoonful of bicarbonate of soda can be added to the water. For those patients who cannot take aspirin, pyramidon 5 gr. every three hours can be used. Warm mouth washes also give relief. Mouth washes are overdone, simple ones are better. Salt one-fourth teaspoonful, borax one-fourth teaspoonful,  $H_2O_2$  one teaspoonful, in a glass of hot water.

For aphthous, stomatitis or canker sore ordinary ulcers, strong caustics can be used, but zinc chloride 8 per cent, followed by iodine is better. Some very useful prescriptions for mouth washes are as follows: (1) Acidi salicylici gr. XXV, glycerine drams V, Aqua menthae piperitae (peppermint) Oz. VI. (2) Acidi borie dram  $\frac{1}{2}$ , potassium chlorate dram 1, Aqua menthae piperitae Oz. VI. (3) Sodii chloride dram  $\frac{1}{2}$ , Sodii borate dram  $\frac{1}{2}$ , glycerine drams  $1\frac{1}{2}$ , Aqua Gaultheriae (wintergreen) Oz. VI.

For Vincent's stomatitis, chromic acid 8 per cent applied locally, and as mouth wash 2 teaspoonfuls of sodium perborate to glass of warm water may be used. Copper sulphate under third molar flaps sealed with white vaseline, or the following prescription is helpful: Arsenous chloride 1 per cent Oz. 1, glycerine drams ii, Wine of Epica q.s. Oz. II. One teaspoonful to wine glass of water as gargle and mouth wash.

When a patient is suffering from nervous irritation and is restless, triple bromides are helpful, one tablet dissolved in a half glass of water should be taken every four hours until the patient feels their effect.

To control swelling, cold applications on the outside of the face are most gratifying. An ice bag kept over the edematous parts ten minutes every hour will relieve congestion. Another soothing cold dressing is a tablespoonful of tincture of Hamamelis or witch-hazel in a glass of water. A cloth is saturated with this solution and kept over the affected area.

For the prevention of infections mouth washes are prescribed. Warm saline solutions, teaspoonful of salt to a glass of warm water. Mercurochrome, 220 soluble, is useful where there are pain and a graying of the edges of the socket. Put just enough crystals in a glass of water to give it an orange color. Two or three crystals will answer this purpose. The action of this drug is rapid, and this is a very efficient mouth wash.

#### HEMORRHAGE

When we know that patients are predisposed to hemorrhage, precautionary measures must be taken to increase the coagulation time of blood. Some people bleed freely without having any organic reason for it. Calcium lactate can be administered to them; at least 20 grains three times a day for several days are given. Routine determination of coagulation time on all patients would require but little time and practically no expense. The procedure would add much to the confidence of the operator, and the knowledge derived would prevent some bad cases of bleeding. The test is simple and can be carried out by an office assistant. I use the capillary tube method. A slight puncture is made in the finger tip or ear lobe which has been swabbed with alcohol. The first drop is

wiped away and the second drop is used for the test. The blood is drawn by capillarity into a glass tube about 1 mm. in diameter and 6 to 10 cm. long. After the tube is filled, it is placed at rest for one minute, and pieces about 1 cm. long are broken off at one minute intervals thereafter. When the blood is coagulated, a thread of fibrin will connect the tube with the piece broken off. This indicates the end of the test. A coagulation time of five minutes or longer deserves special attention. When patients with delayed coagulation time are discovered, I have found the administration of the coagulant Ceanothyn, a vegetable extract containing the alkaloids of *Ceanothus americanus*, has been very satisfactory;  $\frac{1}{2}$  to 1 oz. is given forty-five minutes before the operation and can be repeated as often as necessary since it is nontoxic, or Fibrogen Oral is very satisfactory. I prefer this to the hypodermic or local use. However, good results are obtained with thromboplastin. It should be remembered that thromboplastin acts on blood and not on tissue. Therefore, locally it is necessary to hold it in position two or three minutes under compression to prevent dragging away of the clot web formed at the orifices of the capillaries. An injection of 5 drops of adrenalin 1:1000 to 10 c.c. of normal saline solution is useful in local hemorrhage.

## ABSTRACTS OF CURRENT LITERATURE

### NUTRITION AND PEDIATRICS

By SAMUEL ADAMS COHEN, M.D., NEW YORK CITY

It is the purpose of this JOURNAL to review so far as possible the most important literature as it appears in English and foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

**The Value of Feeding Oysters in Pernicious Anemia.** H. M. Conner, Proc. Staff Meeting Mayo Clinie. 7: 13, 1932.

Because of the favorable experimental results obtained in the treatment of pernicious anemia by feeding rats on green and white oysters, Conner tried the effectiveness of oysters to note whether after partaking of oysters, there was a like regeneration of hemoglobin similar to that produced by the feeding of liver.

In a preliminary report based on the results thus far obtained in four cases of pernicious anemia in the human, Conner notes that it is unlikely that by the administration of oysters a sufficient improvement in the anemia can be brought about to justify their use when other more effective material, for example liver, is reasonably available. He adds, moreover, that further experiments will have to be made before a satisfactory conclusion can be arrived at.

**The Nervous Child.** Julia F. Hill. J. Iowa State M. Soc. 22: 3, 1932.

Since in a very real sense the young child can be said to mirror its home situation, Hill rightly places the chief responsibility of the child's behavior within the home. Frequently a most demoralizing home environment is created for the child by the same emotionally unstable and uncontrollable parents to whom the child owes its neuropathic constitution.

Similarly Hill mentions a rather common observation that a reasonably stable constitution can apparently withstand a surprising number of environmental strains and insults without permanent damage. On the other hand, a wise and understanding rearing with adaption to the particular needs of the child may convert an unstable constitution to a stable one.

In regard to the child's maladjustment, the author wisely states that to discover its real causes a study of the whole child is essential, and this necessarily includes his physical, mental and personality endowment in addition to knowing his background. Hill expresses the sentiments of many medical practitioners when she states that constructive treatment of the nervous child deals with the causes and not the symptoms.

A rather prominent cause of maladjustment with its concomitant neurosis is the propensity of parents to expect more of their offspring than it is capable

of accomplishing. Sometimes as a result, overstimulation and increased strain follow, and habit spasms and stammering occur. It is not uncommon for a child who was acutely sick to continue with or carry over some of the symptoms during its convalescence because of the advantages these symptoms bring with it. Likewise, sometimes a child would subconsciously patent those symptoms which are outstanding with a particular illness of sick elders in the same household. Occasionally such habits or mannerisms of the child as twisting of the neck, facial tie, or a peculiar gait and the like, can be directly traced to the fact that they are mere imitations of some of the habits of the personnel in and about the household.

**Clinical and Pathologic Considerations in Epidemic Poliomyelitis Heine-Medin's Disease.** E. D. Friedman. *Med. Clin. North America* 15: 5, 1932.

Professor E. D. Friedman of New York University states that the diagnosis of poliomyelitis during epidemic times is made on the basis of the characteristic clinical syndrome, namely fever, headache, often accompanied by vomiting, pain in the abdomen, constipation, drowsiness, irritability, and of particular significance is pain on anterior flexion of the spine. In the latter stages of the disease the diagnosis is plainly indicated by the presence of the various paralyses.

This authority warns that while the diagnosis of this disease may be fairly easy during an epidemic, it is at times extremely difficult, particularly when it occurs sporadically. In the differential diagnosis of epidemic poliomyelitis Friedman states that some of the more common conditions to consider are influenza, acute rheumatic fever, multiple neuritis, myatonia congenita, rickets, osteochondritis luetica, plexus palsies of obstetrical origin and osteomyelitis.

The cerebral form of poliomyelitis must be differentiated from the so-called "Graham-Brown-Symmers type" of serous encephalitis, a rapidly fatal form of cerebral involvement, which according to some authors is really due to meningocele. At times it seems much more difficult to differentiate poliomyelitis from the various forms of meningitis, particularly meningococcus and cerebro-spinal meningitis and tuberculous meningitis, but in these diseases, the clinical picture and the laboratory data of the cerebrospinal fluid usually but not always indicate the clinical nature of the lesion.

In the discussion of the distribution of the paralysis, Friedman states that the paralysis is usually asymmetrical and may be present in one muscle or in a group of muscles. In most of the cases one of the lower limbs is involved. The arms are less frequently involved, but when they are involved, the deltoid muscle seems to be the most vulnerable of the muscles of the upper extremity.

The most serious and more fatal cases include lesions of the medulla, which give rise to difficulties in swallowing, alteration of speech and regurgitation of liquids through the nose. Lesions of the upper cervical cord also give a poor prognosis owing to the frequency of involvement of the center for the diaphragm.

This authority states that it must be constantly borne in mind that cases of paralysis, including the most serious ones, frequently recover in a large part—with apparently very little if any residuum remaining.

The mortality rate varies from 5 to 15 per cent. The prognosis is generally worse in older children and in adults. According to Friedman the severity and

onset of the initial symptom are no guide to prognosis. Patients who survive the first seven days of this illness are likely to remain alive.

In regard to paralysis Friedman states that "most recoveries occur within the first six months, but the possibility of a return of function exists up to a year or more after the initial illness. After that time the cases become orthopedic problems."

**Vaccination in Infants.** Marie J. Van Stockum. *Kinderärztl. Praxis* 3: 1, 1932.

As a result of her repeated observations in vaccinating infants against smallpox in Java, Van Stockum's clinical experiences lead her to conclude that constitutional reactions following vaccinations during the first three months of life are few and far between, and when they do occur they are very mild. She states that this observation is in accord with the experiences of physicians in Europe.

Because the same may not be said for infants who are vaccinated after the sixth month or twelfth month of age, Van Stockum recommends that vaccination against smallpox be carried out after the tenth day of life and before the twelfth week. In her opinion six weeks of age seems to be about the best age for vaccinating against smallpox.

**American Administrative Practice in the Control of Scarlet Fever.** George B. Darling and G. E. Gordon. *J. Prev. Med.* 6: 3, 1932.

These writers offer some constructive criticism in their worth while article "American Administrative Practice in the Control of Scarlet Fever." Writing from the Division of Epidemiology and Herman Keifer Hospital, Department of Health, Detroit, Michigan, they call attention to the fact that because cities vary so widely in their administrative technic regarding the regulations for the control of scarlet fever, there seems to be increasing dissatisfaction among those interested in public health. To be more specific, the authors state that from their analysis of the isolation and quarantine requirements in scarlet fever of forty-four of the larger cities in the United States, there were outstanding differences noted in addition to an unfortunate lack of uniformity of the principles involved.

Gordon and Darling feel that health officials of the different cities would do well to adopt some uniform terminology which will be acceptable to the rank and file of health officials throughout the country. Moreover, they urge the adoption of more exacting definitions, to the end that there will be a general agreement among health officials as to the precise meaning and explanation of such descriptive words as, for example, "quarantine," "isolation," "free from contagion," and the like. In this way, through comparison of like experiences of the various cities in their efforts to control the spread of scarlet fever, true progress will be made.

Darling and Gordon are of the opinion that the immediate necessity is for coordinating all the known facts pertaining to scarlet fever instead of making additional efforts to increase the knowledge of this disease.

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## EDITORIALS

### The New Department of Children's Dentistry

IN THE editorial columns of this Journal, particularly during recent months, considerable has been contained in regard to children's dentistry. The relative importance of children's dentistry has gone forward during the last few years with great momentum. There are some excellent reasons for this, among them the fact that the dental profession has become much more nutrition-minded. We have arrived at the scientific stage of development in which we are not only theoretically but definitely conscious that the oral cavity is part of the human body and is subject to the same physical reactions, influences and manifestations as are other parts of the body as a result of disease, nutrition, malnutrition, or

metabolism generally. We now realize that the history of the dental profession has been built largely on the proposition of repair, and we now know that there is another field of equal, if not of greater, importance—the prevention of dental ills. Even the specialty of orthodontia has changed radically; orthodontists realize that one of the most important duties of their practice is to supervise, to watch and to guide the development of the dental architecture into normal occlusion. It was not many years past that the orthodontic perspective was entirely that of correcting malocclusion by mechanical means alone. Dentistry is being linked more definitely with general health movements. For instance, in the state of Illinois it has been ascertained during the last ten years that there has been a noticeable improvement in mortality among people under twenty years of age. A definite upward trend of mortality has been noted in males over twenty years of age and among females from thirty-five to forty-four years of age. It is indicated that health work in the schools in Illinois has been an important factor in the general health conditions among children. Children have been taught to form wholesome, hygienic habits, have been taught balanced diet, and in many instances have enjoyed the advantages of careful medical examination. The Illinois examinations have found numerous physical defects in children, defects perhaps not important at the time, but potentially capable of leading to serious and even permanent impairment. As a result of these examinations, many minor physical conditions have been corrected in their incipiency. A report of a supervising school nurse in one of the Chicago schools shows that in 5,865 children, a very common condition is defective teeth, in about one of every four children; defective vision was found in about one of every ten; organic heart disease in one of every twenty.

When this information, as a result of medical examinations, is given to parents, they are able to correct or alleviate the conditions when possible, and the young people are taught how to choose competent medical and dental service. This type of health service and general survey work is becoming increasingly important in many schools as a part of the general health program, and is improving general health conditions among the younger generation.

Science has recently made discoveries which broaden the field of general dentistry and tie its intense interest in with children's dentistry. It has been found, for instance, that calcium is required for the development of normal teeth, and when found in combination with phosphorus it is best for that purpose. It is known that milk is a convenient available source of calcium, and that a large quantity of milk each day will provide the much needed calcium for a growing child. The body also uses calcium and to better advantage in the presence of vitamin D; the body can provide its own vitamin D if the skin is exposed to the direct rays of the sun every day. During the dark months from December to March, when the direct rays of the sun are not so conveniently available, an egg yolk a day furnishes vitamin D. Vitamin C is needed by the body if dental decay is to be prevented, and it can be furnished by orange juice or by tomatoes, raw or cooked. The child is learning these things at school. Some schools even supply orange juice and tomato juice for growing children. We know now that dentistry is a much broader field than that of filling or straightening teeth; it is greater, wider and broader than a mechanical art.

Realizing the importance and significance of this general trend of dentistry, and anticipating the important position which children's dentistry is destined to occupy in the future activities of the dental profession, the INTERNATIONAL JOURNAL OF ORTHODONTIA, ORAL SURGERY AND RADIOGRAPHY has enthusiastically decided to incorporate a regular department within its pages upon the subject of children's dentistry, in charge of Dr. Walter T. McFall of Macon, Georgia. Dr. McFall enjoys the reputation of being one of the most ardent supporters and one of the most enthusiastic sponsors of children's dentistry in this country; therefore the Journal is indeed fortunate in having Dr. McFall as a member of its editorial staff; also it believes that it is filling a very important need of the dental profession in instituting a modern department on the subject of children's dentistry, particularly since orthodontists as a group are probably more generally interested in children's dentistry than is any other group in the dental profession.

H. C. P.

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**The Thirty-First Annual Meeting of the American Society  
of Orthodontists**

WHEN the American Society of Orthodontists convened in Toronto on the eighteenth of May, its program represented an idea unique in its annals, or in those of any similar organization. From beginning to end, its program embraced chiefly those subjects in their natural sequence which confront the orthodontist in his daily practice; viz., etiology, diagnosis, prognosis, and methods of therapy. Each of these subjects was presented in the form of a symposium, three outstanding practitioners contributing in each instance.

Instead of assigning essayists to definite phases of their subjects, each was requested to prepare his material covering the subject as a whole and was given no hint of the two other men who would present the same subject. Four or five months for the preparation of his material was given so that it was completed before the printed program revealed the names of those who would make similar contributions. By following this plan, it was felt that each would give his thoughts and convictions independently and unhampered by what he might feel would be the opinions and ideas of other contributors. The membership, therefore, was given the opportunity of hearing frank differences of opinion, individual interpretations and conclusions, which not only were instructive but provoked thought. The printed proceedings will contain a vast amount of valuable material.

In addition to the program just mentioned, Dr. John A. Marshall, of San Francisco, presented a summary to date of his research, conducted under the patronage of the American Society of Orthodontists and the University of California, under the title, "A Study of Bone and Tooth Changes Incident to Experimental Tooth Movement and Its Application to Orthodontic Practice." Dr. Manley Bowles of Winnipeg, presented the subject, "The Economic Problem in Orthodontic Practice," and Dr. A. C. Gifford, of Oshkosh, an illustrated paper, showing "The Application of Orthodontic Principles in the Treatment of Fractures of the Jaws." In recognition of the importance of the periodontal membrane, an additional symposium was presented by three representatives of

the University of Toronto, Doctors J. L. Synge, Harold K. Box, and R. Gordon Agnew, the subject being, "Periodontal Studies in Relation to Orthodontia."

One full afternoon was given over to the clinics. These proved to be very popular and represented a wide variety of subjects and methods. As is usually the case, this session enjoyed an enthusiastic attendance which continued in many instances even after the hour of closing had arrived. The room utilized for this purpose was large, well lighted, and well ventilated, thereby enabling all to achieve the maximum benefit.

As is usual at all conventions, numerous business sessions were conducted, an entire evening being given over to the discussion of the new Constitution and By-Laws. This new document was carefully considered and, with certain modifications and changes, was adopted.

The afternoon preceding the opening of the meeting was given over to a golf tournament which proved highly successful and was followed by a dinner at which the prizes were awarded. This affair was typified by a high degree of enthusiasm, there being little difference noticeable between those who were awarded prizes and those who had failed to win such good fortune.

On the evening of the second day of the meeting, a dinner dance with general entertainment was staged for the benefit of the members, their ladies and guests. This was held at the Royal York Hotel which housed all other sessions of the meeting on a floor especially arranged for conventions. The local arrangements committee, consisting of Toronto orthodontists, had planned things so carefully and made all arrangements so thoroughly that everything ran smoothly from the opening session until the final hour of the meeting. The gratitude of the membership is due this group for the very efficient manner in which they functioned.

*J. D. M.*

#### **An Appreciation of Toronto's Hospitality**

**T**HIS is a word of appreciation and commendation to the Toronto boys.

Dr. Fisk and all his committees planned efficiently, worked tirelessly, and now have the satisfaction of knowing that their efforts were appreciated and that the arrangements were ideal.

The Royal York Hotel provided accommodations that are unsurpassed anywhere, with a convention floor that was all that could be desired in freedom from noise, perfect acoustics, ample space for exhibiting, committee meetings, etc.

Beginning with a handshake and "Pick me up" greetings on arrival, there were nineteen holes of golf on Tuesday and a real "here's how" welcome by His Honor, Major Stewart on Wednesday. Plans had been made for every moment until Friday evening, and every wish and fancy for one's pleasure and comfort were provided.

Presentation of the bronze tablet in memory of the late Dr. Guy G. Hume, former president, was made at the luncheon Thursday, and the society paid its respects through its spokesman, Dr. Ollie White.

The scientific program, which was arranged by the Board of Censors under the direction of Dr. James McCoy, deviated somewhat from the usual plan, as the

symposiums presented cross-cut viewpoints and discussions of very practical subjects. Careful study of the published proceedings will overcome to some extent the lack of general discussion which time did not permit. The clinics presented Friday afternoon under the direction of Dr. William Murray were considerably above the average, practical and instructive. Securing clinics is possibly the most difficult assignment of the program committee, and the clinicians should be commended for their excellent cooperation.

It is the present plan that next year's program should continue the symposium plan by presenting detailed diagnosis of several types of malocclusion with equally detailed methods of treatment, thereby making a practical application of the symposiums presented at the 1932 meeting.

Assuredly, the members who attended the Toronto meeting greatly appreciated the efforts made by the Bloor Street gang, ably assisted by their wives, in making the local arrangements an entire success. With true hospitality, unhampered by the Volstead amendment, they showed us they were glad to have us, and after a hectic week of work and worry over us, they could not be blamed if they were also glad to see us depart.

Absent members missed a really delightful and worthwhile meeting, and also the "On to Oklahoma City" bagpipe parade Friday afternoon. However, all can fall in line and start making plans to be present next year, as President "Alfalfa Bill" Flesher and the Southwestern Society of Orthodontists extend to one and all a welcome invitation to attend.

*P. G. S.*

## **RESOLUTIONS**

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### **"IN MEMORIAM" RESOLUTIONS OF THE AMERICAN SOCIETY OF ORTHODONTISTS**

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#### **J. Lowe Young**

In the passing of Doctor J. Lowe Young on May 23, 1931, at his home in New York City, the American Society of Orthodontists has lost a past president and one of its old members who has always been active in the society's affairs and in the orthodontic profession.

Doctor Young was born in Eckford, Middlesex County, Ontario, Canada, February 10, 1868. His professional education was received at the Toronto Dental College, and the Philadelphia Dental College from which he was graduated in 1890. He was in general practice for three years immediately following his graduation, and then moved to Detroit where he continued in general practice for about fifteen years.

He was a member of the second class of the Angle School and after graduation was a teacher in that institution.

In 1905 Doctor Young moved to New York City and was established in the exclusive practice of orthodontia. Because of his ability and love for his profession a large clientele was his at an early period.

He was appointed professor of orthodontia in the School of Dental and Oral Surgery at Columbia University when it was organized, but ill health forbade this connection and he was forced to discontinue his teaching.

In addition to his having been a member and former president of this society, Doctor Young held many other memberships and offices in various dental and orthodontic organizations. He was a member and former president of the First District Dental Society of New York, a member of the New York Dental Society, of the American Dental Association, the Eastern Association of Graduates of the Angle School of Orthodontia, the New York Academy of Dentistry, the New York Society of Orthodontists, the Second District Dental Society of New York, the Delta Sigma Delta Dental Fraternity, a Fellow of the American College of Dentists, a member of the New York Athletic Club and the Lotus Club.

Doctor Young is survived by his wife, Hester Bateman Young, three daughters, two sons, one of whom, Doctor Glenn F. Young, is a member of this society, and a grandson.

In his leaving us this society has suffered an irreparable loss, but a powerful influence for the best in the orthodontic and dental professions will remain as a token of his having been with us.

WHEREAS, Almighty God has pleased to remove by death our worthy brother and past president of this Society, Doctor J. Lowe Young, be it therefore

*Resolved*, That we, the members of the American Society of Orthodontists, assembled at our first meeting since his passing, do deeply feel the loss of this great leader and member of this society; and be it further

*Resolved*, That we tender to the bereaved family our heartfelt sympathy and that a copy of these resolutions be spread upon the records of our Society.

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#### **Joseph Whynman**

In the death of Doctor Joseph Whynman of New York City on November 28, 1931, this society has lost a valued member and faithful craftsman.

Doctor Whynman was born in 1875. Following his preliminary education he studied and practiced pharmacy for a short period of time. Later he began the study of dentistry at the Pennsylvania College of Dental Surgery, from which institution he was graduated in 1904. He was engaged in the general practice of dentistry at Elizabeth, New Jersey, for ten years and then entered the specialty of orthodontia. In 1920 he moved to New York where he continued the practice of orthodontia until his death.

Dr. Whynman was a member of his local, state, and the American Dental Association. Besides his membership in this society he was a member of the New York Society and of the Southern Society of Orthodontists. He was a charter member of the Mount Nebo Lodge of Free Masonry of Elizabeth, New Jersey, and a member of the New York Consistory.

He is survived by his wife, Pauline; two sons, Dr. Edward Whynman, in the practice of dentistry, and William, a United States attorney; and a daughter, Elizabeth.

WHEREAS, Doctor Joseph Whynman has left us and passed beyond, be it therefore

*Resolved*, That we, the members of the American Society of Orthodontists, do deeply feel his loss and do offer our heartfelt sympathy to the members of his family; and be it further

*Resolved*, That a copy of these resolutions be spread upon the records of this Society and sent to the members of his family and to the journals for publication.

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#### **Victor L. Lay**

One of our younger members, Dr. Victor L. Lay, passed away at his home in Buffalo on Sunday, May 15, 1932.

Doctor Lay was born in 1894. He was graduated from the Dental Department of the University of Buffalo in 1912. Following his graduation he taught in the orthodontic department of his Alma Mater for several years. He also assisted in the office of Dr. Abram Hoffman during this period. In 1918 he began specializing in the practice of orthodontia.

Doctor Lay was a member of his local and state societies and the American Dental Association, as well as of this society. He was active in the affairs of the alumni of the University of Buffalo.

He is survived by his wife, Mae C. Lay, and two children.

WHEREAS, Dr. Victor L. Lay has left us and passed beyond, be it therefore  
*Resolved*, That we, the members of the American Society of Orthodontists, do deeply regret our loss and do offer our heartfelt sympathy to his family; and be it further

*Resolved*, That a copy of these resolutions be spread upon the records of this Society and sent to the members of his family and to the journals for publication.

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**S. Merrill Weeks**

The society has lost by death on November 9, 1931, Dr. S. Merrill Weeks, one of our oldest members.

Doctor Weeks was born December 16, 1872. He was graduated from the University of Pennsylvania Dental School in 1900. Following his graduation he taught orthodontia at his Alma Mater for a number of years. He was the first man to specialize in the practice of orthodontia in Philadelphia and was always a practitioner of the highest integrity.

Doctor Weeks was a member of his local and state societies and the American Dental Association. Besides his membership in this society he held memberships in the New York Society of Orthodontists, the Academy of Stomatology, the Manufacturers' Club and the Union League Club, both of Philadelphia, and of the Aronomink Golf Club and Seaview Golf Club.

WHEREAS, Dr. S. Merrill Weeks has passed beyond, be it therefore  
*Resolved*, That we, the members of the American Society of Orthodontists, do deeply mourn because of our loss and do offer our sympathy to the members of his family, and be it further

*Resolved*, That a copy of these resolutions be spread upon the records of this Society and sent to the members of his family and to the journals for publication.

May 18, 1932.

## BOOK REVIEWS

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### **Gold Inlays by the Indirect System\***

*Gold Inlays by the Indirect System* is by Henry W. Gillett, D.M.D., Professor of Dentistry, School of Dental and Oral Surgery, Columbia University; Fellow of the Dental Society of the State of New York; Active Fellow of the New York Academy of Dentistry; Formerly Instructor of Operative Dentistry, Harvard Dental School; member of the Board of Dental Examiners, State of Rhode Island; and by Albert John Irving, D.D.S., formerly Assistant Professor of Crown and Bridgework, University of Michigan School of Dentistry; Active Fellow New York Academy of Dentistry. The book contains 596 pages, with 539 illustrations.

This is an attractive volume and is beautifully done from cover to cover. The fact that five thousand dentists ordered the book before it had been advertised indicates some of the attention which it has attracted.

The book not only treats of the primary subject featured in its title, but in addition to gold inlays it takes it up in no small way and detail cavity preparation by classes for the indirect method of gold inlay, other methods of filling teeth, the technics of cavity preparation, and special cases. There is no department of its subject that is not covered in great detail. This book may be commended as being up to the minute; its illustrations, its detail, care and precision are conspicuous and outstanding, a book unusually well done.

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### **Lang's German-English Pronouncing Medical Dictionary†**

*Lang's German-English Pronouncing Medical Dictionary*. 4th Edition. 56,500 Words. 926 Pages, 313 more pages than previous edition. Pronunciation in simple English phonetics. Revised and edited by Milton K. Meyers, M.D., Neurologist to the Northern Liberties Hospital; Chief of Nerve Clinic, St. Agnes Hospital; Consulting Neurologist, Jewish Hospital, Philadelphia.

The present edition of this dictionary has been reset from cover to cover because of the extensive revision made by the editor. Three thousand five hundred new words have been added.

A feature of the edition is the pronunciation, which has been made as simple as possible, and follows the system used in Gould's "Medical Dictionary" and Hackh's "Chemical Dictionary," which has met with general approval.

The editor is aware that the English pronunciation of German words can, at best, be no more than approximated. He knows for instance that the German final "e" is not so broad as the English "a" which he has used as an equivalent. Students of the German language should have no difficulty with the "ch" sound

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which is indicated by "k" nor should they have trouble with the umlaut sounds as the editor has simplified them. He believes that if the words are pronounced to a native German as indicated that that person should have little or no difficulty in recognizing them.

In certain words the editor has given a "k" sound to a "c." Many Germans who prefer the "s" or "ts" sounds may take exception to this; nevertheless the editor has authority for the "k" sound. An attempt has been made to discriminate between the long and short German vowels, but it was not felt necessary to go to the extent and nicety with which the Greek and Latin dictionaries differentiate the long and short vowels, so essential in those languages for versification purposes.

Many of the German words have a secondary accent, but only one has been given herein; this is usually the primary accent, but in certain compound words beginning with the same word-element the secondary accent is given instead. After all, in conversation at least, the syllable mainly accentuated is contained in the word-element most closely associated with the idea to be emphasized.

A dictionary devoted to a language that is so largely made up of compound words as the German is, cannot be expected to contain all the possible combinations of the simpler words, nor should one expect to find in a scientific dictionary terms current in everyday speech.

Owing to the great variety and number of words herein translated and defined, the translator of German publications as well as the casual reader of the German literature, German orthodontic literature and other scientific matter will find this glossary of great help, time saving, as well as instructive.

## NEWS AND NOTES

### Southern Society of Orthodontists

The twelfth annual meeting of the Southern Society of Orthodontists will be held in Knoxville, Tenn., on October 31, November 1 and 2.

The program committee consisting of Clinton C. Howard, W. A. Clarke of Atlanta, Ga., and Winston P. Caine of Chattanooga, Tenn., have arranged a splendid program. To date the following essayists have accepted: Drs. Milo Hellman, New York City; A. Leroy Johnson, New York City; B. H. Broadbent, Cleveland, Ohio; Hugh K. Hatfield, Boston, Mass., and W. W. Woodbury, Halifax, Nova Scotia.

The clinic committee reports that fifteen clinicians have been secured to date from the members of the Southern Society. An effort will be made to secure several clinics from other societies. The outlook is for one of the largest meetings in the history of the Southern Society.

We wish to extend a most cordial invitation to all orthodontists and members of the dental profession.

A unique part of the program will be an outing in the mountains on Tuesday afternoon with a barbecue dinner that night.

CLAUDE R. WOOD, President,  
608 Medical Arts Bldg.,  
Knoxville, Tenn.

GEORGE M. ANDERSON, Secretary-Treasurer,  
831 Park Ave.,  
Baltimore, Md.

### The American Society for the Advancement of General Anesthesia in Dentistry

The scientific program for the season of 1932-1933 of the American Society for the Advancement of General Anesthesia in Dentistry will commence on Monday evening, October 24, at the New York Physicians Club, 133 E. 58th Street (corner of Lexington Avenue), New York City.

The meeting will open with a dinner at 7 P.M., and the scientific session at 8:15 P.M. Dr. James R. Cameron of Philadelphia, Pa., will read a paper entitled "The Control of Emergencies arising during General Anesthesia." Discussion will be opened by Dr. Robert A. Robinson of Albany, N. Y.

Membership in this organization is available to members of the American Dental Association and American Medical Association, and registered nurses or scientists interested in the field of anesthesia.

Officers for the ensuing year are:

JAMES TAYLOE GWATHMEY, M.D., Honorary President,  
133 E. 58th Street,  
New York City.

M. HILLEL FELDMAN, D.D.S., President,  
730 Fifth Avenue,  
New York City.

LEONARD S. MORVAY, D.D.S., Secretary and Treasurer,  
76 Clinton Ave.,  
Newark, N. J.

**Joint Convention of British, Canadian and Ontario Dental Associations**

The attention of the dentists of the United States is again directed to the Joint Convention of the British, Canadian and Ontario Dental Associations to be held at the Royal York Hotel, Toronto, August 8-12, of this year. This will be the largest dental meeting ever held in Canada, and our confreres in the United States are cordially invited as guests. The golf committee is arranging an international dental golf tournament, so bring your clubs with you.

ARTHUR W. ELLIS,  
ROBERT J. READE,  
HONORÉ THIBAULT,  
FRED J. CONBOY,  
Publicity Committee.

**Dean of Washington University School of Dentistry is Honored**

Dean Walter M. Bartlett of the Washington University School of Dentistry, St. Louis, reached the retirement age on the first of July, 1932. In recognition of his forty years of service the Corporation of Washington University honored Dr. Bartlett with the honorary degree of Master of Science.

The control of the school has been placed in the hands of an ad interim committee composed of Dr. Jesse D. White, Dr. Ewing P. Brady, Dr. Virgil Loeb and Dr. Russell G. Fobes until such time as a full-time dean may be appointed. Dr. White is to serve as chairman of this committee and acting dean.

**Greater New York December Meeting**

The eighth annual Greater New York December Meeting will be held at the Hotel Pennsylvania, New York City, December 5-9, 1932.

This meeting is held under the auspices of the First and Second District Dental Societies.

The program is being developed with the idea of devoting more than the usual amount of attention to the things that count for efficiency in the everyday practice of our profession.

CARROLL B. WHITCOMB, Chairman.

**Sixty-Seventh Annual Meeting of Ohio State Dental Society**

The Ohio State Dental Society will hold its 1932 meeting in Cleveland on December 5, 6, and 7. Arrangements are being made for a program by outstanding men in the various specialties of dentistry. The program will be divided into the four sections of dentistry, and the four sections will be in session at one time, thus insuring a maximum diversity of choice in the type of program.

EDWARD C. MILLS, Secretary,  
255 East Broad Street,  
Columbus, Ohio.

**American Society of Oral Surgeons and Exodontists**

The fourteenth annual meeting of the American Society of Oral Surgeons and Exodontists will be held in Buffalo, N. Y., at the Hotel Buffalo, September 9 and 10, 1932.

E. W. BROWNING, President,  
921 Boston Building,  
Salt Lake City, Utah.  
HARRY BEAR, Secretary,  
410 Professional Building,  
Richmond, Va.

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Salt Lake City, Utah.

HARRY BEAR, Secretary,

410 Professional Building,

Richmond, Va.

**Association of American Women Dentists**

The eleventh annual meeting of the Association of American Women Dentists will be held at the Statler Hotel, Buffalo, N. Y., on September 12, 1932. A cordial invitation is extended to all women dentists.

GENEVA E. GROTH, Chairman Publicity Committee,  
1301 Medical Arts Bldg.,  
Philadelphia, Pa.

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**American Dental Assistants Association**

The Lafayette Hotel has been designated as headquarters for the eighth annual meeting of the American Dental Assistants Association which will be held in Buffalo, N. Y., September 12-15, 1932. For further information address

RUTH M. CLARK, General Secretary,  
Suite 1-4, Seaford Building,  
Minot, North Dakota.

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**American Congress of Physical Therapy Section on Stomatology**

The eleventh annual scientific session of the American Congress of Physical Therapy will be held at the Hotel New Yorker, New York City, September 6-9, 1932. A section on stomatology has been organized, and on September 9 a full day's program will be offered in this specialty.

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**The Society of Plastic and Reconstructive Surgery**

The Society of Plastic and Reconstructive Surgery held its first scientific meeting June 3, at the New York Academy of Medicine, New York City. The first annual meeting of the society will be held on October 28 and 29, 1932, at the New York Academy of Medicine.

GASTON LABAT, General Secretary,  
30 E. 40th Street,  
New York City, N. Y.

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**Items of Interest**

Dr. Louis Braun announces the removal of his office to 765 David Whitney Building, Detroit, Mich. Orthodontia exclusively.

Dr. Charles H. Patton announces the removal of his office to 235 South Fifteenth Street, Philadelphia, Pa. Orthodontia exclusively.

Dr. Helen Stahle announces the removal of her offices to the Sunset Medical Building, 8006 Sunset Blvd., Hollywood, Calif., for the continuance of the practice of orthodontia.

Dr. Charles H. Tweed announces the opening of his office at 806 Consolidated National Bank Building, Tucson, Arizona. Orthodontia exclusively.